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Report on the Oak Ridge Sewage
Sludge Land-Farming Experience

Part I - Data Presentation

T. W. Oakes³⁶
H. M. Braunstein³⁶
K. L. Daniels³⁶
W. F. Ohnesorge³⁶
J. T. Kitchings³⁶
W. A. Alexander³⁶

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REPORT ON THE OAK RIDGE SEWAGE SLUDGE
LAND-FARMING EXPERIENCE

Part I - Data Presentation

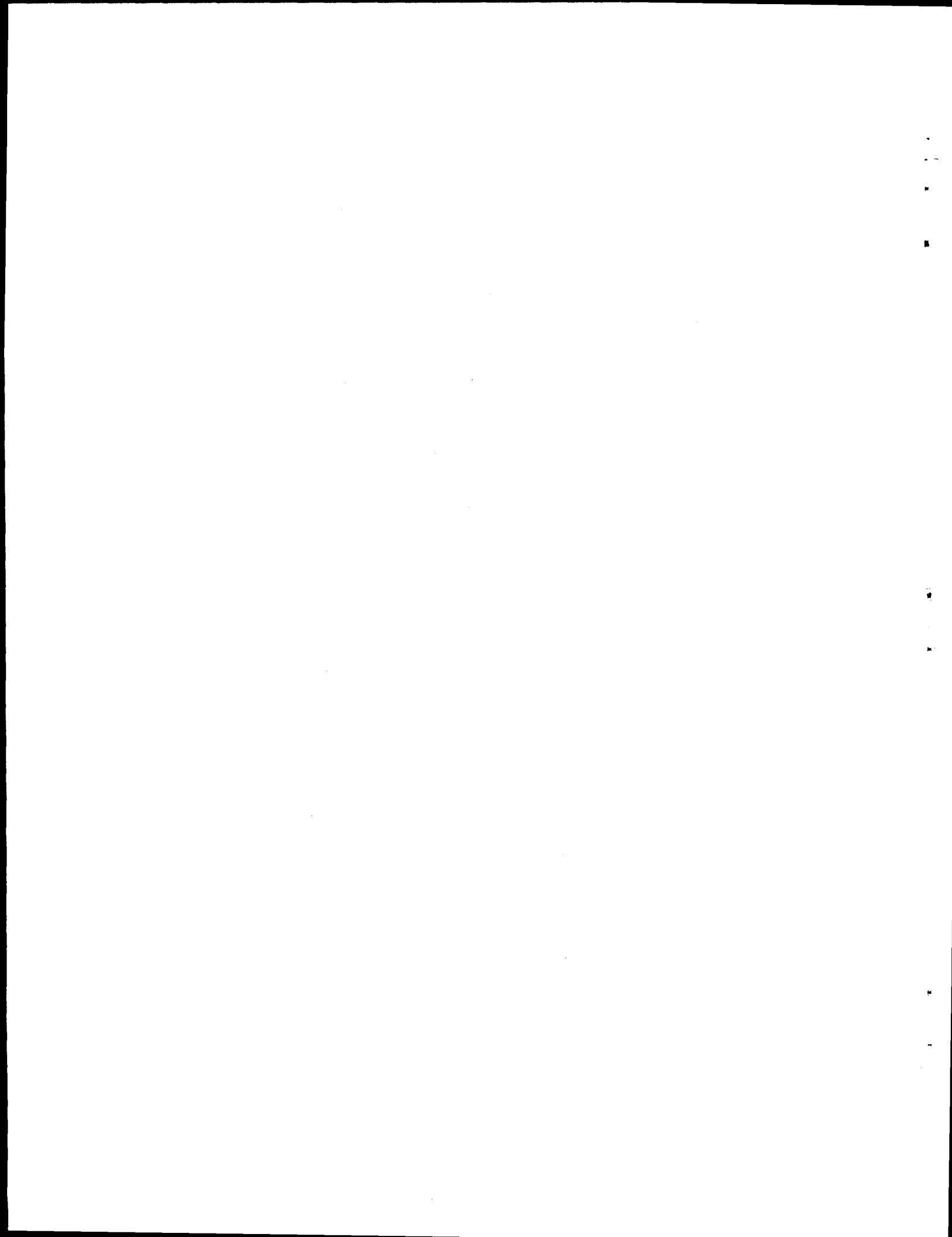
T. W. Oakes
H. M. Braunstein
K. L. Daniels

W. F. Ohnesorge
J. T. Kitchings
W. A. Alexander

Department of Environmental Management
Environmental and Occupational Safety Division

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Executive Summary

In 1978 negotiations were initiated between the city of Oak Ridge and the Department of Energy (DOE) Oak Ridge Operations Office to consider the land disposal of treated sludge from a new city sewage treatment plant, which was scheduled for completion in 1983. The sludge was to be placed on several parcels of land (~ 1500 acres) located within the DOE Oak Ridge Reservation for a trial period of five years. The sludge was to be used as a nitrogen and phosphorus nutrient supplement for tree planting operations on poor quality forest sites within the Reservation. The initial sludge disposal site consisted of 65 acres located on the southeast side of Chestnut Ridge, bordered on the south by the old Bethel Valley Road and on the west by Mount Vernon Road. Deposition on this site was begun in November 1983.

On March 22, 1984, it was learned that some of the deposited sludge had been contaminated with various radionuclides primarily Co-60 and Cs-137. A radiation survey had been performed above the City's sewage main on Emory Valley Road. The readings were as high as 45 μ R/hr (5 times background) midway between the L&N railroad line and Lafayette Drive. Disposal of sludge on the 65-acre site was temporarily halted on March 25, 1984 and the comprehensive sampling and monitoring study described in this report was instituted on March 30, 1984.

A systematic random sampling design was used to characterize the entire disposal site (~65 acres). Eleven transects were run perpendicular to the surface flow gradient, 140 ft. apart. Soil cores were collected on March 31 and April 1, 1984 along each transect 180 ft. apart for a total of 117 cores, which were extracted to various depths, depending on the ability to penetrate the soil layer. Each core was separated into three parts: the upper 3 inches, the middle section, and the bottom 3 inches. The upper portion was considered most likely to represent the previously broadcast sludge; the middle portion, the tilled soil mixed with sludge; and the bottom portion, the undisturbed subsurface layer. Sufficient core material was taken

at each coring site to ensure the collection of enough material for analytical precision.

Samples were analyzed for gamma activity, principally from Cs-137 and Co-60, in all top and middle layer samples. Where detected, Mn-54 and Cs-134 were also reported. Alpha and Beta activity analyses, which are time-consuming, and labor-intensive, were performed on a random sampling of the extracted cores consisting of 25% of the top portions of the cores (30 samples). Samples were analyzed for Sr-90, U-234, U-235, U-238, Pu-238, and Pu-239.

The majority of the radioactivity was determined to be in the upper 3 inches of soil. A statistical treatment of the analytical results provided an estimate of the total activity at the site, the vertical distribution of the gamma activity, and the areal distribution of the primary radionuclides. A total of 170 mCi of activity was estimated as present in the top 3-inch layer of the 65-acre site, 69% of which was contributed by Co-60 and Cs-137, 23% by U-234 and Sr-90, and 8% by other minor radionuclides. Detailed estimates are given in the table below. :

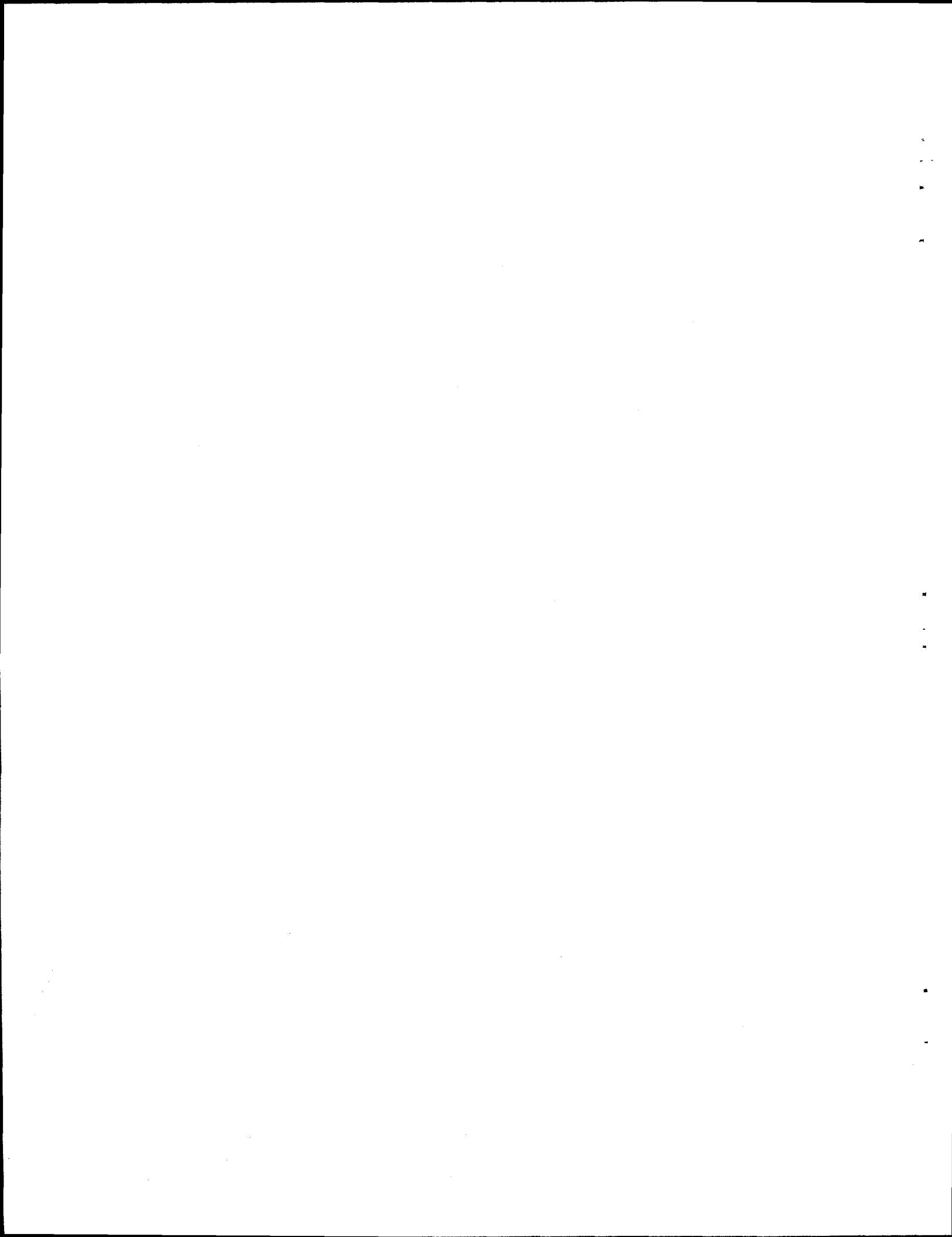
Summary of Total Activity in the Top 3-inch Soil Layer

Radioisotope	Total Activity (mCi)	% of Sum	Cumulative %
Co-60	74	43	
Cs-137	44	26	69
U-234	24	15	84
Sr-90	13	8	92
U-238	11	6	98
U-235	2	1	99
Pu-239	1	<1	
Pu-238	.1	<1	

Sum 170 mCi in top 3-inch soil layer

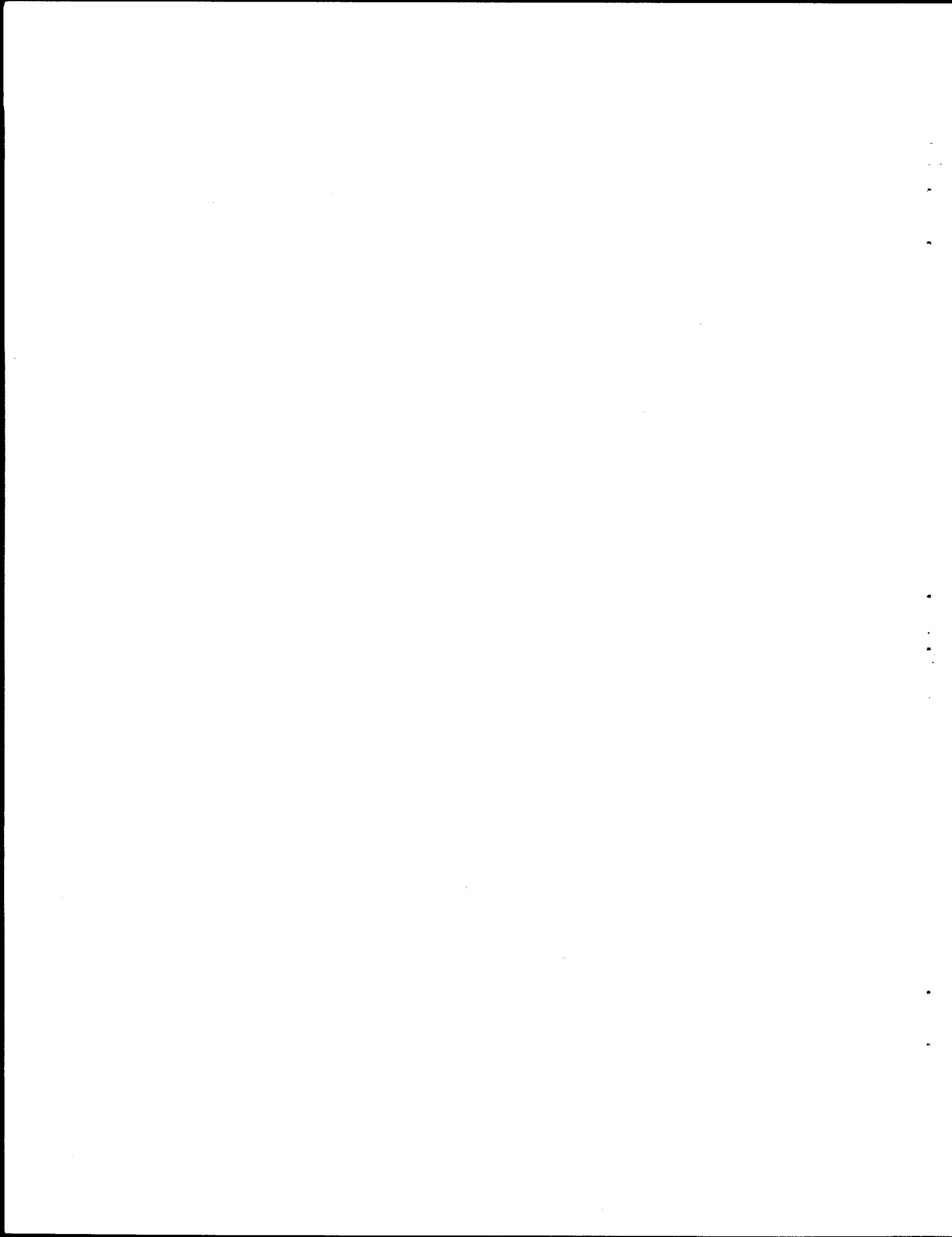
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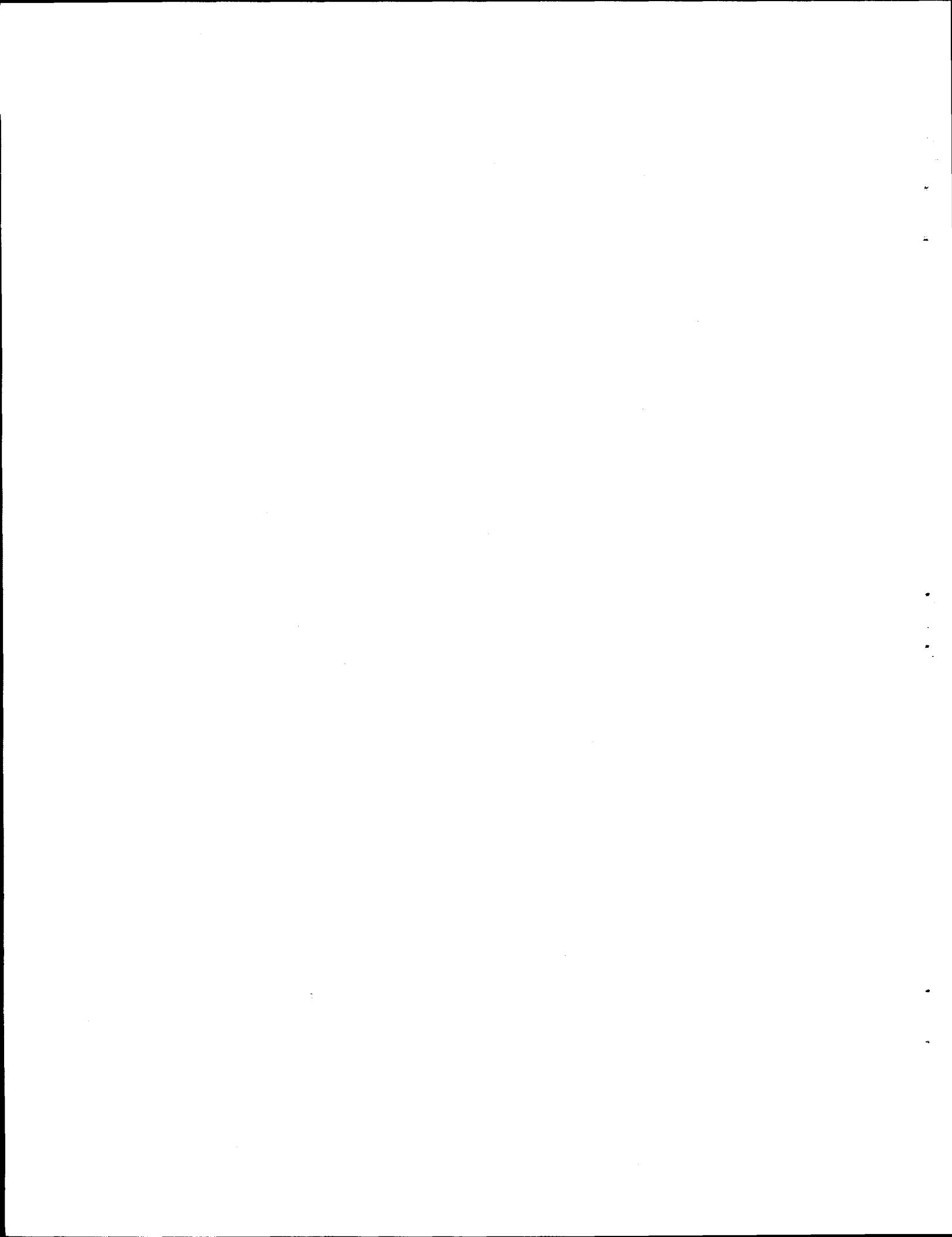
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ABSTRACT

Disposal of sludge from the City of Oak Ridge's sewage treatment facility on a 65-acre site on the Department of Energy's Oak Ridge Reservation was initiated in November 1983. On March 22, 1984, DOE and the City determined that the sludge contained radioactive materials. Application of sludge on the Reservation was suspended on March 25 and a comprehensive survey and sampling plan was instituted to radiologically characterize the disposal site. By April 1, a radiation walkover survey had been completed on the site and samples of air, water, and soil had been collected to be analyzed for the presence of radionuclides.

The mean air dose rate, one meter above the ground surface, was found to be 13 $\mu\text{R}/\text{hr}$ with a range from about 8 $\mu\text{R}/\text{hr}$, which is the usual background level in the area, to 21 $\mu\text{R}/\text{hr}$. Concentrations of Cs-137 and Co-60, the principle contaminants in the soil, were essentially below the analytical detection limits in the air and water. About 350 soil samples were collected by extracting cores to a depth of 12-15 inches according to a systematic random sampling design. Each core was separated into three sections; the top 3 inches, a middle section, and the bottom 3 inches to represent layers on the site. The majority of the radioactivity was determined to be in the upper 3 inches of soil.

A statistical treatment of the analytical results provided an estimate of the total activity at the site, the vertical distribution of the gamma activity, and the areal distribution of the primary radionuclides. A total of 170 mCi of activity was estimated as present in the top 3-inch layer of the 65-acre site, 69% of which was contributed by Co-60 and Cs-137, 23% by U-234 and Sr-90, and 8% by other minor radionuclides.

REPORT ON THE OAK RIDGE
SEWAGE SLUDGE LAND-FARMING EXPERIENCE

INTRODUCTION

Background

In 1978 negotiations were initiated between the city of Oak Ridge and the Department of Energy (DOE) Oak Ridge Operations (ORO) Office to consider the land disposal of treated sludge from a new city sewage treatment plant (STP), which was scheduled for completion in 1983. The sludge was to be placed on several parcels of land (~ 1500 acres) located within the DOE Oak Ridge Reservation for a trial period of five years as a nitrogen and phosphorus nutrient supplement for the tree planting operations on poor quality forest sites within the Reservation. Preliminary studies began in 1978 to determine the amount of sludge which could be applied on Reservation lands without violating State and EPA regulations governing nitrogen and phosphorous concentrations in leachate from the disposal sites.

In 1980 and 1981 DOE/ORO, ORNL, and the City of Oak Ridge verbally agreed (Bradburn, personal communications, 1984) to dispose of the sludge on the Reservation with the following stipulations:

- a. DOE would furnish the sites and assist with application,
- b. the City would take responsibility for transporting and applying the sludge, and monitoring the site, and
- c. the City would obtain a permit from the State for the disposal operation.

In 1983, DOE/ORO gave permission to State personnel (letter to John Leonard, TDPH from J. A. Lenhard, DOE/ORO, October 18, 1983) to enter the Reservation to inspect potential disposal sites. The City had to have an adequate disposal plan for sludge disposition prior to receiving Federal assistance for construction of the new treatment facility.

In early November 1983, the State issued a verbal okay for the City to begin the sludge disposal operation (letter to Lowell Strunk, City of Oak Ridge from M. S. Burris, TDH&E, November 28, 1983) but DOE/ORO requested that the permission be given in writing. This was done shortly before Thanksgiving and the disposal of sludge was begun on a 65-acre tract of land which had been tilled (Fig. 1) prior to application. On March 22, 1984, a radiation survey detected radioactivity in soil samples collected above the City's sewage main on Emory Valley Road. The readings were as high as 45 $\mu\text{R}/\text{hr}$ (5 times background) midway between the L & N Railroad line and Lafayette Dr. Samples of sludge were collected from the disposal site on March 25 and subsequent analyses indicated amounts of both Cs-137 and Co-60 were present. A preliminary survey with a GM meter showed readings in excess of 60 $\mu\text{R}/\text{hr}$ at contact. Disposal on the site was temporarily halted on March 25 and the comprehensive sampling and monitoring study described in this report was instituted to radiologically characterize the disposal site, and to provide data for evaluating the potential environmental risks of continuing sludge disposal operations.

The authors wish to express their appreciation to Department of Environmental Management personnel T. T. Clark, F. K. Edwards, B. J. Hendrix, H. M. Hubbard, C. Y. Horton, D. W. Parsons, J. L. Malone, J. D. Story, and J. B. Watson for their efforts in collecting and preparing the large number of samples required in the analyses; to J. S. Eldridge, N. A. Teasley, and T. G. Scott, Analytical Chemistry Division for analyzing the samples; and to A. C. Wittmer, K. C. Scott, and L. B. Maudlin for typing and coordinating the logistics involved in preparing the final version of the report.

Description of the Disposal Site

The sludge disposal site consists of approximately 65 acres located on the southeast side of Chestnut Ridge (Fig. 2). It is

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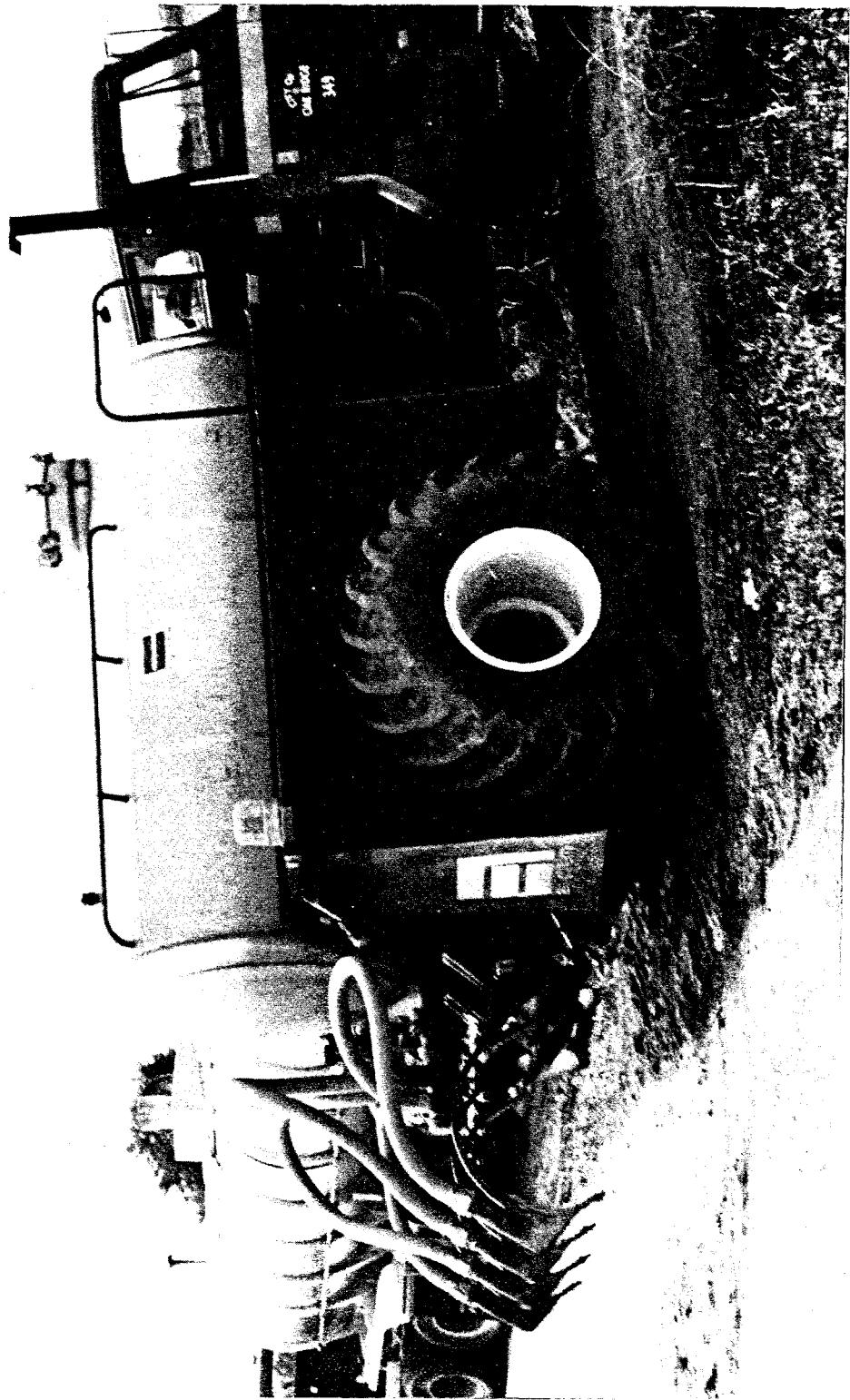


Fig. 1 Tilling Operation

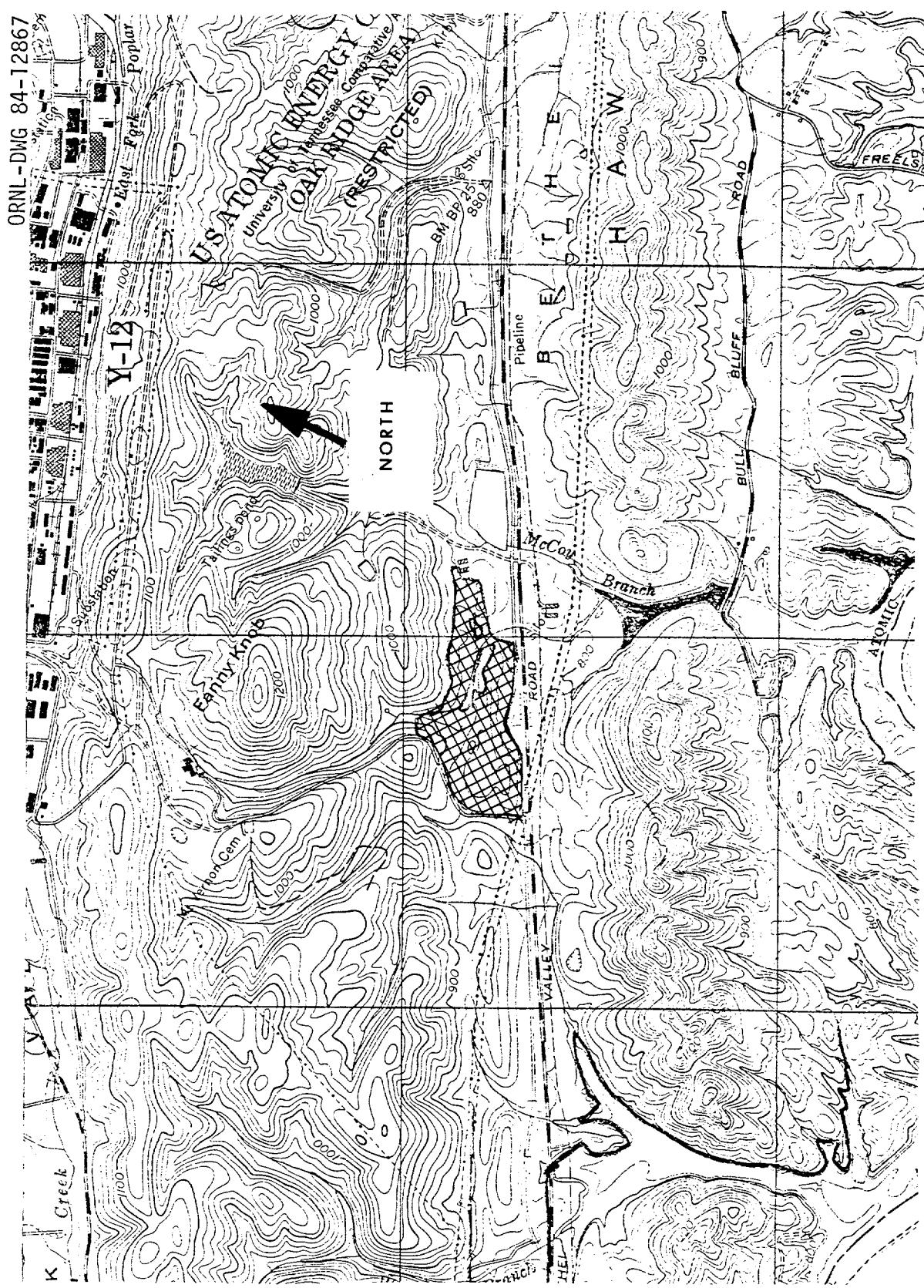


Fig. 2 Site for Sewage Sludge Land-Farming

bordered on the south by the old Bethel Valley Road and on the west by Mount Vernon Road. The land surface is hilly with moderate slopes and a total relief of up to 200 feet. Surface drainage is to the southeast; first into Bethel Valley and subsequently into the Melton Hill Reservoir of the Clinch River about 1 mile to the southeast. Drainage from the eastern edge of the site is toward Rogers' Quarry. The site is underlain by the Chickamauga limestone formation, which is mainly gray to blue-gray argillaceous or shaly limestone, sometimes occurring relatively "pure" and sometimes interbedded with calcareous shales of varying thickness. The soil on the site is a chert loam of mixed Collegedale, Sequoia, Leadvale, and Armuchee associations with cherty silt loam along the creek (drain) that bisects the area (Fig. 3). A forested area which occurs in the center of the site along the creek was left undisturbed because the soils were very shallow due to an outcrop of rock in the area. To the east of the creek, a small farm pond is accessible via a tractor road (Fig. 3). Two springs occurs just to the northwest and upgradient of the site. Meteorological conditions on the site at the time of sampling are shown in Table 1.

Description and Objectives of the Disposal Activities

The 65-acre site had been cleared for use as pasture and farm cropland when the land for the DOE Oak Ridge Reservation was acquired in 1942. After acquisition, the area was planted in Loblolly pine trees which were maintained on the site throughout the 1940s and 1950s. In 1963 the site was again cleared and has remained as pasture since that time. Because the soils on the Reservation suffer high leaching rates, many of them are in need of nutrient amendment, especially to correct calcium and phosphorus deficiencies. Because Loblolly pine is not a nutrient-demanding species, and because the municipal sewage sludge could supply the needed nutrients to the soil, it was the objective of the disposal program to amend depleted soils on several Reservation sites and reforest them with Loblolly pine trees.

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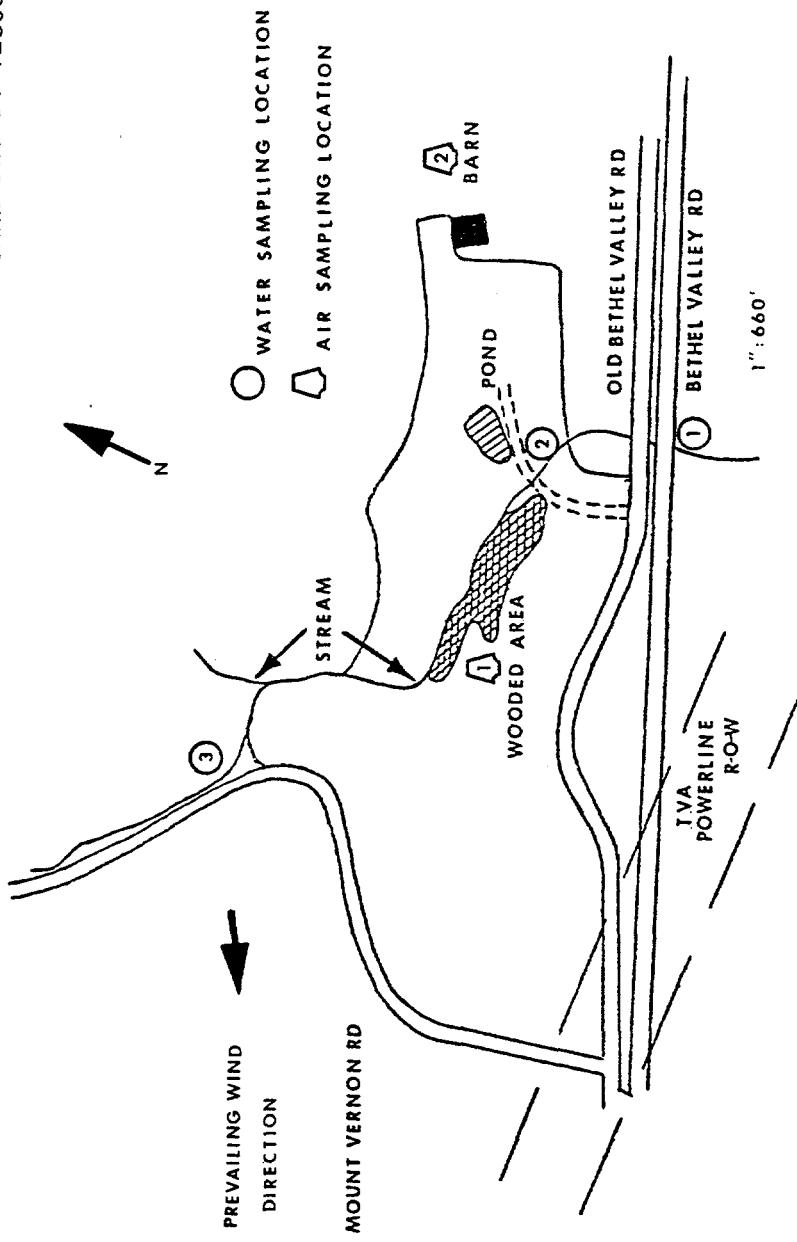


Fig. 3 Disposal Site Features

Table 1. Average Meteorological Conditions During the Interval Sampling was Conducted at the Sludge Disposal Site

Date	Number of Samples	Average Meteorological Conditions				
		Wind Direction	Wind Speed (MPH)	Temperature (°C)	Relative Humidity (%)	Precipitation (In)
March 31, 1984	71	NE	7.6	42.6	75.4	0.0
April 1, 1984	45	NE	5.7	46.7	74.9	0.0

The procedures (Bradburn, personal communication, 1984) for sludge-spreading were designed to minimize sludge loss through runoff and thereby to reduce potential environmental impacts. The sewage sludge, which contained 4-5% solids, was transferred from the City of Oak Ridge STP to the site in a 6000-gallon tanker truck (Fig. 4). At the site, the liquid sludge was pumped from the tanker to a 1600-gallon spreader (Fig. 5). The spreader comes equipped with high-speed subsurface injectors that are designed to inject the sludge into the soil at a depth of 6-8 inches and at a rate of 600-800 gallons per minute while moving at speeds from 0-6 miles per hour. In the first applications, problems were encountered with subsoil injections and may not always have been accomplished. Sections scheduled for deposition were normally tilled both before and after application of the sludge. However, tilling after the last applications has been delayed pending results of the radiological characterization study. A total of 500,000 gallons of sludge have been applied to the site between November 1983 and March 22, 1984 in five separate applications.

SAMPLING METHODOLOGY

The purpose of the sampling was to radiologically characterize the disposal site, to detect any radionuclide movement from the site via air and water pathways and to provide the information needed for making decisions regarding additional sludge disposal.

Air Sampling

Two Hi-Vol air samplers were placed in the sludge farming area on the old Bethel Valley Road. Both were placed in the prevailing wind direction, one on-site (location 1 in Fig. 3) and the other adjacent to the site to the northeast (location 2, Fig. 3). Samples were collected for 6-1/2 hours in order to determine radionuclide concentration for comparison with backgrounds collected at perimeter monitors.

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Fig. 4 Tanker Truck

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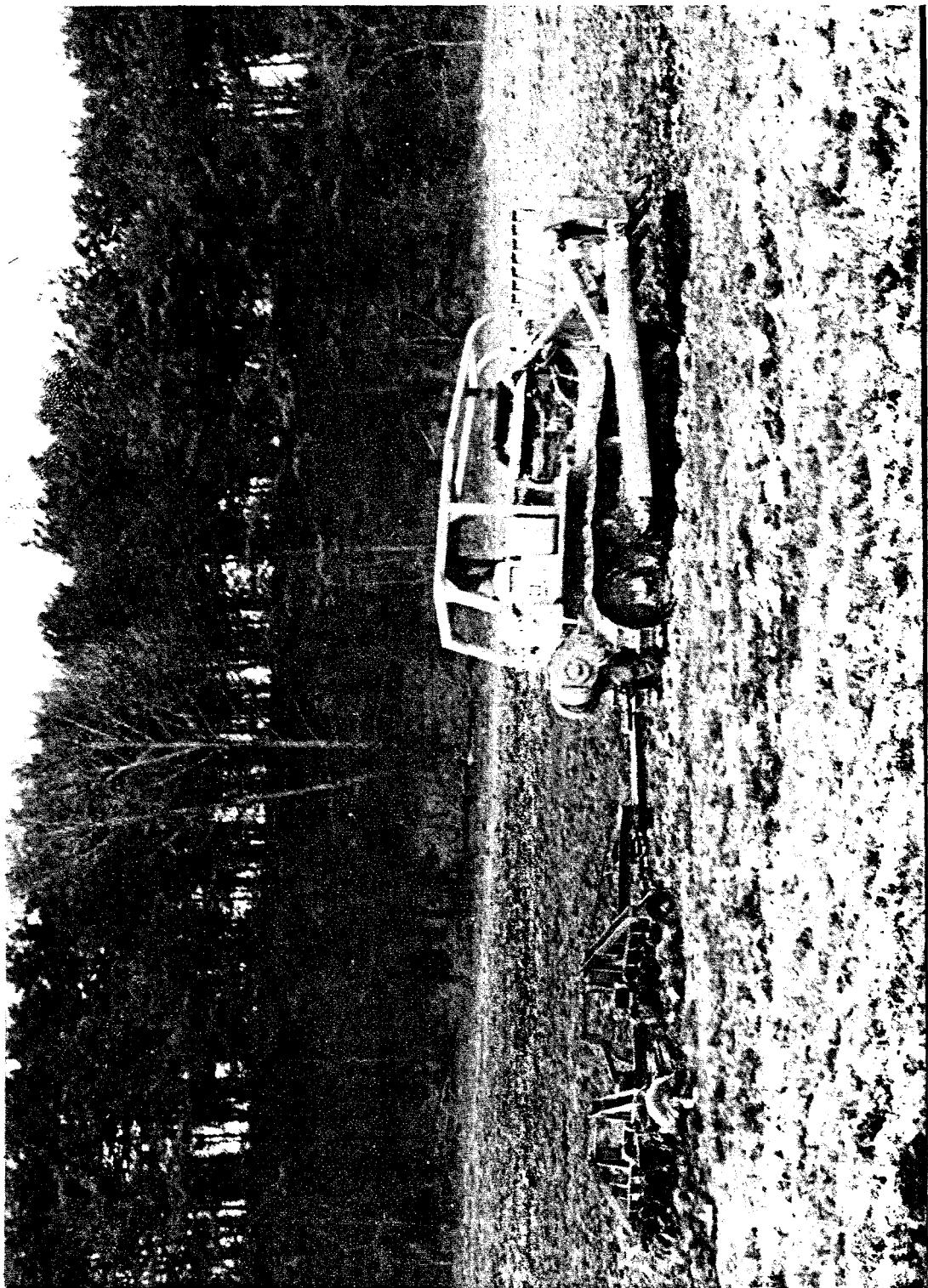


Fig. 5 Spreader

Surface Water Sampling

Composite Samples - Two portable samplers were placed in locations where composite samples of runoff from the field were collected. One of these was placed within the site (location 2, Fig. 3) and the other downgradient of the site at location 1 (Fig. 3).

Grab Samples - Six water samples were collected from the unnamed creek into which runoff from the disposal field drains: two upgradient from the disposal site (location 3, Fig. 3,); two in the site, (location 2, Fig. 3); and two downgradient from the site (location 1, Fig. 3).

Groundwater Sampling

Because there are no wells anywhere near the disposal field, no groundwater samples were collected as part of this study. However, sampling plans are being developed to address this potential off-site transport.

Sediment Sampling

Samples of creek sediment were collected at the same time that the water samples were collected and from the same locations (Fig. 3). The sediment samples were processed and analyzed in the same manner as the soil samples.

Disposal Field Sampling

Road Monitoring - Bethel Valley Road between the Oak Ridge STP and the disposal field was visually inspected for evidence of sludge spillage.

Field Walkover Survey - A walkover survey of the entire disposal site was conducted and the results were available during the soil sampling. The preliminary walkover survey to estimate the degree of

contamination was completed using a Geiger-Muller survey instrument and a pressurized ionization chamber was used to determine $\mu\text{R}/\text{hr}$ readings.

Soil Sampling - A systematic random sampling was used to characterize the entire 65-acre site. This method was chosen because of the ease in locating sampling locations and because it frequently provides greater information per unit cost than does simple random sampling. It was decided that approximately 100 locations should be sampled. Transects were run perpendicular to the flow of surface water every 140 feet. Stations along each transect were sampled every 180 feet (Fig. 6) on March 31 and April 1. To guarantee that the samples were random, the first transect was randomly selected from the first ten transects along the edge of the site closest to Bethel Valley Road. In addition, the first station along the first transect was randomly selected out of the first ten stations at the southeastern end of the transect. They were extracted by coring to various depths, depending on the ability to penetrate the soil layer. Each core was separated into three parts: the upper 3 inches, the middle section, and the bottom 3 inches. The upper portion was considered most likely to represent the previously broadcast sludge; the middle portion, the tilled soil mixed with sludge; and the bottom portion, the undisturbed subsurface layer. Sufficient core material was taken at each coring site to ensure the collection of enough material for analytical precision.

ANALYTICAL PROCEDURES

Selection of Samples for Analysis

From information obtained from DOE (Hibbitts, DOE, personal communication, 1984), it was thought that Cs-137 and Co-60 were the primary radionuclides in the sludge, although it was suspected that minor amounts of Mn-54 and Cs-134 would also be present. Therefore, to adequately characterize the site both in terms of surface and

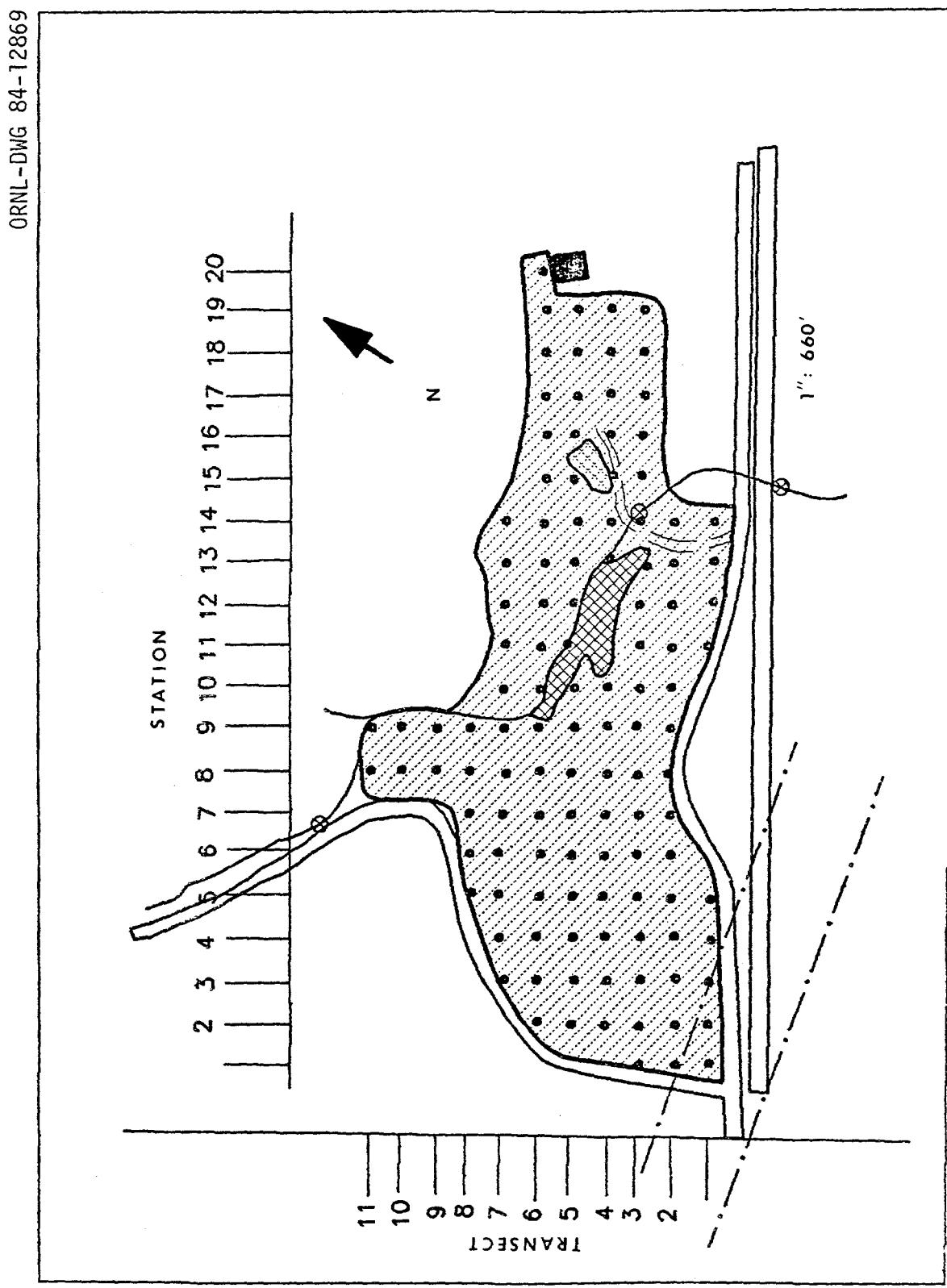


Fig. 6 Sampling Point by Transect
and Station

subsurface distribution of radioactive contamination, one sample was taken from the top portion and the middle portion of each core. This resulted in 234 samples being analyzed for gamma activity. The bottom portions of the cores were retained for future analyses, if warranted. In addition to gamma activity, it was deemed desirable to also characterize the site with respect to Alpha and Beta activity. Since analyses for this type of activity are time-consuming, and labor-intensive, and since high concentrations were not anticipated, it was decided to perform these analyses initially on 25% of the top portions of the cores (30 samples). Based on a preliminary evaluation of the results of the walkover survey and a knowledge of historical disposal activities, a stratified random sampling plan was used to select samples for further analyses. Three areas were identified within the site and ten cores were randomly selected from each area for analysis. Samples taken from the top portion of each of the 30 selected core samples were analyzed for the radionuclides, Sr-90, U-234, U-235, U-238, Pu-238, and Pu-239.

Sample Preparation

For gamma ray spectroscopy, core samples, as received, were first mixed in shallow rectangular trays to homogenize the sample material. A representative sample (wet) was packed into a counting container, weighed, and analyzed by gamma scan spectroscopy. The remaining material was weighed, dried, and either stored or analyzed for Transuranics (TRU) and ⁹⁰Sr activity. Wet-to-dry weight ratios were determined from the dried portion of the sample.

For Alpha and Beta activity analysis, the 30 core samples were dried at 105° F, pulverized to 100 mesh particle size, and thoroughly mixed prior to removing a representative aliquot for wet radiochemical analysis. In addition, to compare the calculated dry-weight-based gamma activities with measured dry-weight-gamma activities, a counting sample was prepared for each of the 30 selected cores using the dried, pulverized, material. The procedures used in the analytical work are given in Oakes, et al (1981).

Hi Vol air filters, as received, were submitted for analyses and counted directly as received. Blank filters were analyzed for comparison. All surface water samples were filtered through a 0.45 micron millipore filter prior to submission for analyses. Only the filtrate was analyzed. Nine hundred mLs of the samples was put into a Marinelli beaker for counting. Sediment samples were prepared in the same manner as the soil samples.

Sample Analyses

All samples were analyzed for gamma emitters. Sr-90 and transuranic concentrations were determined for selected soil samples. The gamma spectra of the samples were determined using a high-resolution gamma-ray spectroscopic method appropriate for the particular sample (Oakes, et al 1981). The counting sample was placed directly on the end cap of a high-resolution germanium-lithium detector and the spectral data was accumulated in a computer-based pulse-height analyzer system (e.g., Nuclear Data 6620 Analyzer) which operated with its own software for quantifying gamma-emitting radionuclides.

The alpha radioactivity of the soil samples was determined using leaching, separation, elution, and precipitation techniques (Oakes, et al 1981). Transuranic ions were carried out of solution deposited on stainless steel disks which were analyzed by alpha spectrometry.

The ⁹⁰Sr activity in the soil samples was determined by separation and precipitation from solution as strontium oxalate monohydrate, which was dried on a filter, mounted, and counted for beta activity using a Geiger-Muller counter.

Statistical Analyses

All statistical analyses were performed on an IBM 3033 computer using the Statistical Analysis System (SAS 1982). Data for radionuclides in each soil layer were summarized. Extreme values in

core samples were reanalyzed in the laboratory for verification. The values reported were precise and all were used in the calculations of the minimum, maximum, mode, median, and mean.

Tests of normality were conducted on the activities (pCi/g dry weight) of radionuclides in each soil layer using the Shapiro-Wilk statistic if the sample size was less than 51, and the Kolmogorov D statistic for larger sample sizes (SAS 1982).

If the data did not appear to be normally distributed, several transformations including the log (value), log (value +1), square root of the value, and the log (value +K/2), where K varied from 2 to 20.

ANALYTICAL RESULTS

Analytical results may be preceded by a "less than" (<) symbol. The "less than" values are not constant because they were determined for each individual sample by an integrating technique that includes the magnitude of the background interference and the total weight or amount of sample. These values vary because they are not just estimates of the limit of detectability of the measuring instruments.

Air Analyses

During the soil sampling operations (2 consecutive days, 3/31/84 and 4/1/84) two portable Hi-Vol air samples were operated for at least 6 1/2 hrs on each day to determine the amount of airborne radioactivity at the locations shown in Fig. 4. The analytical results are shown in Table 2.

Table 2. Air Filter Analytical Results

<u>Day</u>	<u>Sample</u>	<u>Activity (pCi/CF)</u>	
		<u>Cs-137</u>	<u>Co-60</u>
1	1	< 6 x 10 ⁻⁵	< 4 x 10 ⁻⁵
1	2	< 8 x 10 ⁻⁵	< 6 x 10 ⁻⁵
2	1	< 5 x 10 ⁻⁵	< 5 x 10 ⁻⁵
2	2	< 6 x 10 ⁻⁵	< 5 x 10 ⁻⁵

A more comprehensive sampling program is anticipated which will measure airborne particulates and radioactivity.

Water Analyses

Water samples were also collected during the two-day soil sampling operations at the three locations shown in Fig. 4. Both grab samples (WG) and 24-hour composite samples (WC) were collected. The results of gamma scan analyses are shown in Table 3.

Walkover Survey

Data collected in the walkover survey are shown in Table 1A (Appendix A). Readings were taken with a portable pressurized ionization chamber sensitive to gamma radiation. The instrument was mounted on a tripod so that the ionization chamber was always one meter above the ground surface. Readings were taken at each of the stations where soil cores were to be extracted. Each value listed in Table 1A is an average of three sequential readings taken within a minute or two of each other. Table 2A (Appendix A) contains a listing of the survey readings listed from highest to lowest. The readings ranged from 7.3 to 21.1 $\mu\text{R}/\text{hr}$, with a mean value of 13.1 $\mu\text{R}/\text{hr}$. The background air rate dose measured in a field across the Bethel Valley Road from the disposal site was 8 $\mu\text{R}/\text{hr}$. The visual inspection of the roadways between the sewage treatment plant and the disposal site did not turn up signs of sludge spillage during transport.

Soil Analyses

Soil core samples were divided into top, middle, and bottom layers. For this study, analyses were performed only on the top and middle portions. Gamma scans for the first four radionuclides were performed on the moist, as-received samples and "corrected" to a dry weight basis by multiplying the measured activity by the wet-to-dry

Table 3. Analytical Results of Water Samples

<u>Day</u>	<u>Location</u>	<u>Sample</u>	<u>Type</u>	Activity ($\mu\text{Ci/mL}$) \pm uncertainty ($\mu\text{Ci/mL}$)		
				<u>Sample #</u>	<u>Cs-137</u>	<u>Co-60</u>
1	1	grab	WG1	$1.7 \times 10^{-3} \pm 1.5 \times 10^{-3}$		$< 2.0 \times 10^{-3}$
1	2	grab	WG2	$< 1.5 \times 10^{-3}$		$< 1.8 \times 10^{-3}$
1	3	grab	WG3	$2.1 \times 10^{-3} \pm 1.8 \times 10^{-3}$		$< 2.4 \times 10^{-3}$
2	1	composite	WC1	$< 2.3 \times 10^{-3}$		$< 2.7 \times 10^{-3}$
2	2	composite	WC2	$2.6 \times 10^{-3} \pm 1.7 \times 10^{-3}$		$< 1.7 \times 10^{-3}$

ratio for the sample. Sr, U, and Pu analyses were performed using dried samples. It was assumed that the water removed from the samples did not contain significant concentrations of radionuclides. Thus the tables of data for Co, Cs and Mn will contain activities based on both wet sample weight and dry sample weight whereas data for the other radionuclides will contain activities based only on the dry weights of the samples.

Tables 3A through 6A (Appendix A) contain a listing of activities for each core sample by transect number, station number, and soil layer. The values for the uncertainties given in columns 6 and 8 reflect only the statistically derived counting uncertainties. They do not reflect uncertainties that might occur due to nonhomogeneity of counting samples, voids in the counting samples (although samples were carefully handled to ensure homogeneity and tight packing) or other unforeseen sample-related phenomena. Column 3 contains values for the net wet weight of the core portions and column 4 gives the wet-to-dry weight ratio for the core sample as determined by drying a portion of the core sample at 105°F. These data were used to obtain core sample densities. Column 5 gives the activities of each sample in pCi/g wet weight.

In Tables 7A through 10A (Appendix A), the dry weight activities are listed from the highest to the lowest values. These data were used in producing contoured activity maps of the disposal site as discussed in the conclusions section.

In Table 11A, the activities of Sr-90 and radioisotopes of the transuranic elements, U and Pu are given. In Tables 12A through 16A, the same data are arranged from highest to lowest for each of these radioisotopes.

Both Cs-134 and Mn-54 were detected in a limited number of top layer soil samples during the gamma scan. The activities detected and the sample transect and station designations are given in Tables 18A and 19A. Ten out of 234 samples showed Cs-134 activity and 12 out of 234 showed Mn-54 activity.

Except for Co-60, for which no background level is available, consideration of the normal background levels, indicates an average

contribution of about 50% to the mean values. Since the means are conservative values (data reported as "less than" values are converted to absolute values in the statistical calculations), the extent to which the means exceed background levels may not be statistically significant.

Results of Statistical Analyses

For all radionuclide results summarized in Table 4, except Pu-239, the median was less than the mean indicating a skewed distribution. Tests for normality indicated that only Pu-239 activities (pCi/g dry weight) were normally distributed. The mean and 95% confidence limits for Pu-239 activities (pCi/g dry weight) are 0.039 and 0.031 to 0.047. No transformations were found to normalize Co-60 in either the top or middle soil layers, Cs-137 in the middle layer, Cs-134 in the top layer, and Mn-54 in the top layer. This is thought to be due to the large number of samples with values less than the minimum detectable levels (Table 5). Cs-134 and Mn-54 were detected in only 9% and 10%, respectively, of the 117 top soil layer samples scanned. Cs-137 and Co-60 in the middle soil layer were detected in 52% and 17% of the 117 samples, respectively. In the top soil layer, Co-60 was detected in about 67% of the samples. The activities (pCi/g dry weight) of the other radionuclides in the top soil layer (Cs-137, Sr-90, U-234, U-235, U-238, and Pu-238) were determined to be lognormally distributed.

The logarithmic transformation of these activities was used to calculate the mean and 95% confidence limits for the transformed variable. Antilogs of the mean and of these limits were used to calculate the derived mean (= geometric mean) and the 95% confidence limits (Table 6).

For example, for Sr-90, the mean of the transformed variable is -0.32 and the 95% confidence coefficient is .11. Antilog of -0.32 = 0.48 and antilog \pm 0.11 = \pm 1.29. Therefore the derived mean = 0.48 and the 95% confidence limits are 0.48 \pm 1.29 = 0.37 to 0.62. In all these cases, the derived means are less than the means of the untransformed data (Tables 4 and 6).

Table 4. Summary Data for Radionuclides in Samples

Radioisotope	Soil Layer	# of Samples	Background Levels in Soils*	Activities (pCi/g dry wt)			
				Average	Minimum	Maximum	Mode
Co-60	Top	117	--	0.08	44.8	0.13	0.85
Cs-137	Top	117	1.2	0.09	15.4	0.6	0.94
Sr-90	Top	30	0.28	0.1	1.9	0.4	0.4
U-234	Top	30	0.48	0.41	3.78	0.86	0.84
U-235	Top	30	0.074	0.01	0.27	0.05	0.05
U-238	Top	30	0.34	0.1	1.32	0.38	0.41
Pu-238	Top	30	0.0008	0.0001	0.037	0.027	0.004
Pu-239	Top	30	0.023	0.002	0.07	0.043	0.042
Co-60	Middle	116	--	0.02	8.16	0.12	0.21
Cs-137	Middle	117	--	0.01	4.8	0.24	0.26

* Determined by routinely monitoring soils on the Reservation.

Table 5. Radionuclide Analyses Below Minimum Detectable Level

Radioisotope	Soil Layer	Number Samples Analyzed	Values Less Than Minimum Detectable Level	
			Number	Percent
Co-60	Top	117	39	33.3
Cs-137	Top	117	4	3.4
Cs-134	Top	117	107	91.4
Mn-54	Top	117	105	89.7
Sr-90	Top	30	0	0
U-234	Top	30	0	0
U-235	Top	30	0	0
U-238	Top	30	0	0
Pu-238	Top	30	11	36.7
Pu-239	Top	30	1	3.3
Co-60	Middle	116	96	82.8
Cs-137	Middle	117	56	47.9

Table 6. Derived Means¹ (pCi/g dry weight) of Radionuclides in Top Soil Layer and the 95% Confidence Limits about Mean

Radioisotope	Number Samples Analyzed	Derived Mean	95% Confidence Limit
Cs-137	117	1.05	0.88 to 1.26
Sr-90	30	0.48	0.37 to 0.62
U-234	30	0.94	0.76 to 1.16
U-235	30	0.07	0.05 to 0.10
U-238	30	0.41	0.33 to 0.50
Pu-238	30	0.004	0.002 to 0.007

¹ Derived mean (= geometric mean)

Pearson's product-moment correlation coefficients (SAS 1982) were calculated for Cs-137, Sr-90, U-234, U-235, U-238, Pu-238, and Pu-239

in 30 samples from the top soil layer using the normal or normalized data. Table 7 gives only those correlation coefficients that are significantly different ($p < .05$) from zero. Cs-137 was positively correlated with U-234 and U-238 but not U-235. U-234 and U-238 were positively correlated with Cs-137 and with all other uranium isotopes. U-235 was correlated with the other uranium isotopes but not Cs-137. Sr-90, Pu-238, and Pu-239 were not correlated with any of the radionuclides.

CALCULATIONS

Conversion to Dry-Weight Activities

The gamma radionuclide activities were reported on a wet-weight basis. These values were "corrected" to a dry-weight basis for each individual sample using the relationship

$$\frac{\text{pCi}}{\text{g wet weight}} \times \frac{\text{g wet weight}}{\text{g dry weight}} = \frac{\text{pCi}}{\text{g dry weight}}$$

The dry-weight activities were used in all the data analysis programs. Activities reported as "less-than" values were considered absolute values in the statistical calculations.

Table 7. Significant ($p < .05$) Correlation Coefficients¹
Among Radionuclides in Top Soil Layer (Dashes in
table indicate nonsignificant correlation coefficients)

	Cs-137	U-234	U-235	U-238
Cs-137	1.00	0.79	--	0.75
U-234	0.79	1.00	0.54	0.86
U-235	--	0.54	1.00	0.46
U-238	0.75	0.86	0.46	1.00

¹ Based on a total of 30 samples.

Total Core Activities

To obtain total activities for core samples, the dry density of each core segment was calculated using the calculated dry weight for the segment and the volume of each core segment, which was obtained using the inside diameter of the coring instrument and the measured length of each core segment. The pertinent parameters are given in Tables 20A through 24A along with total activities in each case. In Tables 25A through 34A the activities are given for each radionuclide listed from highest to lowest activity.

Statistical Summaries

For those radionuclides that were either normally or lognormally distributed, the mean values for the total core activity (pCi) was calculated using the mean or derived mean activity (pCi/g dry weight), the mean density per core (1.27 pCi/cm^3), and the total core volume (667 cm^3). These means are given in Table 8.

Table 8. Summary Data for Activities in Cores

Radioisotope	Soil Layer	# of Samples	Mean Activity (pCi/core)
Cs-137	Top	117	889
Sr-90	Top	30	407
U-234	Top	30	796
U-235	Top	30	59
U-238	Top	30	347
Pu-238	Top	30	3.4
Pu-239	Top	30	847

In order to estimate the total activity at the disposal site it was necessary to extrapolate the data from the representative cores to the entire site. Because Co-60 and Cs-137 data were available for 117 cores (in each

layer) and because these cores were systematically distributed over the entire site, it was possible to assume each core was at the center of a soil parcel of which the core was representative, and to extrapolate the core activity to the entire parcel and to sum the activity of all the parcels for a total activity.

The total Co-60 and Cs-137 activities in both the top (0-3") and middle (3-9") soil layers at the sludge land-farming site (LFS) were estimated using the 117 core samples (CS). Each core sample represented a 180' x 140' soil segment (SS) of the site. The activity in each soil layer (i) was calculated for each radionuclide (j) by summing the activity (mCi) over all the cores:

$$\text{Activity}_{\text{LFS}_{ij}} = \sum_{k=1}^{117} (\text{Concentration}_{\text{CS}} \times \text{Density}_{\text{CS}} \times \text{Volume}_{\text{SS}})$$

Where, i = soil layer (top or middle) and

j = radionuclide (^{137}Cs or ^{60}Co)

Because the other radionuclides were not analyzed in all of the 117 samples, the total activity in the top soil layer at the site was estimated using the mean or derived mean concentration (pCi/g dry weight), the mean density per core (1.27 pCi/cm^3) and the total volume of the top 3-inch soil layer of the site ($2.08 \times 10^{10} \text{ cm}^3$).

These calculations were performed only for the top soil layer because of the excessive number of "less than detectable" values in the middle soil layers. Results of these calculations are given in Table 9.

DATA REVIEW

The total activity at the 65-acre disposal site was estimated to be about 170 mCi in the top 3-inch soil layer. A note of caution is advisable in interpreting or utilizing these data. First, the values should not be considered an evaluation of the activity transferred to the site in the

Table 9. Summary of Total Activity in Top 3-inch
Soil Layer at Sludge Land Farming Site

Radioisotope	Total Activity (mCi)	% of Sum	Cumulative %
Co-60	74	43	
Cs-137	44	26	69
U-234	24	15	84
Sr-90	13	8	92
U-238	11	6	98
U-235	2	<1	99
Pu-239	1	<1	
Pu-238	.1	<1	
Sum	170 mCi in top 3-inch soil layer		

deposited sewage sludge. Since no monitoring of the site took place before deposition of the sludge, no baseline data were available for evaluating background activity levels at the site before deposition. An indication of average background levels in other areas is given in Table 4. As an example of the magnitude of change that could be expected when background levels are introduced into the calculations, the total Cs-137 activity in the top soil layer is reduced from 44 mCi to about 20 mCi if 1.2 pCi/g of the measured Cs-137 activity is assumed to have been present at the site as a result of accumulated fallout. In addition, the values for the total activity should be considered conservatively high estimates. Concentrations reported as "less-than" values were entered into the calculations as absolute values, which results in summations that are biased conservatively high.

The distribution of the activities reported in the overall summary Table 9 in the top soil layer is diagrammed in Figure 7. Co-60 and Cs-137 contribute about 69% of the activity while U-234 and Sr-90 contribute about 23%. The remaining 8% comes from the other U isotopes and Pu.

ORNL-DWG 84-12870
DISTRIBUTION OF RADIONUCLIDES IN TOP 3" SOIL LAYER AT DISPOSAL SITE

TOTAL ACTIVITY [mCi]

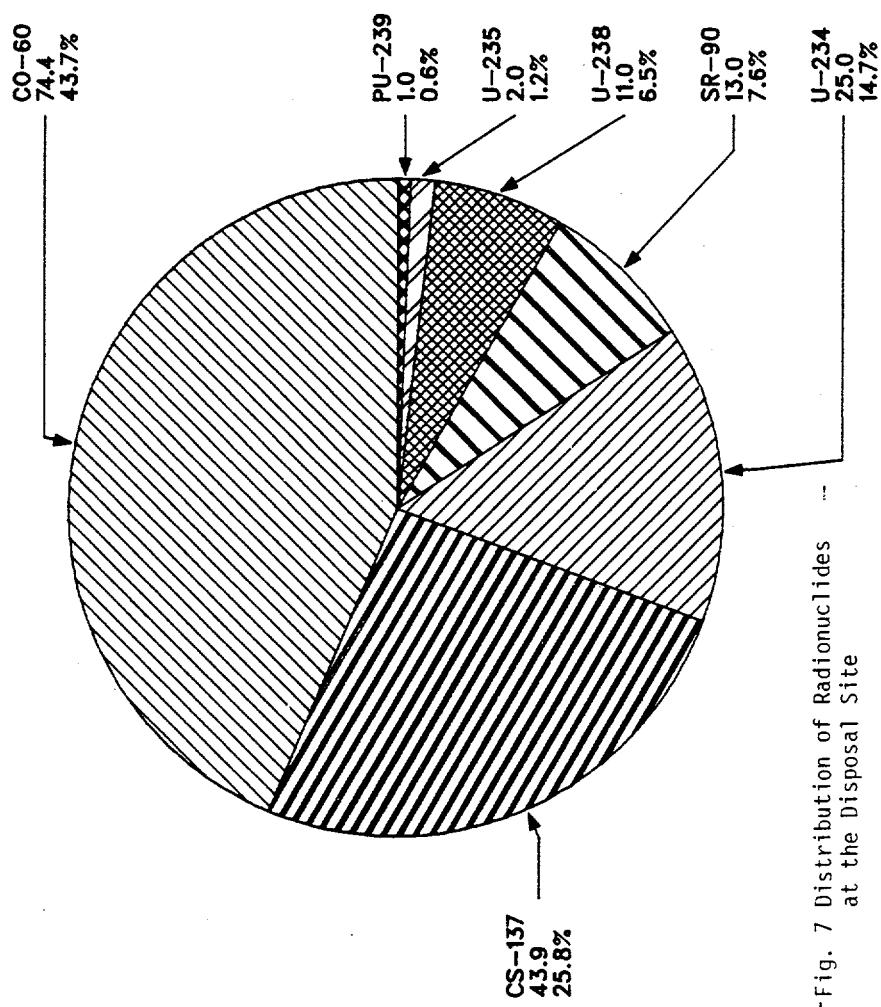


Fig. 7 Distribution of Radionuclides
at the Disposal Site

An analysis of the areal distribution of the activity at the site indicated some discernable patterns. Contours representing the readings in the walkover survey are given in Figure 8. Caution is again advised in interpreting the magnitude of the readings, since the pre-disposal background dose rate was not subtracted from the readings. If the background rate were uniformly distributed over the site, it would not alter the distribution pattern, which is consistent with the pattern of activities measured in the extracted cores (Figures 9-12). Areas of highest activity appear well delineated on the maps, e.g., at the southeasternmost corner of the site adjacent to the roadway; at the center of the site at the southwestern edge of the wooded area; in the southwesternmost corner of the site, and within the northernmost tip of the site adjacent to the creek. It was not possible to estimate the total activity in the middle soil layer due to the excessive number of "less than detectable" values. The Co-60 and Cs-137 activity in the middle soil layer appears to be distributed similarly to that in the top soil layer (Figures 9-12).

WALKOVER SURVEY
Dose in Air (microR/hr)
(Normal background is approximately 8 microR/hr)

ORNL-DWG 84-12871

29

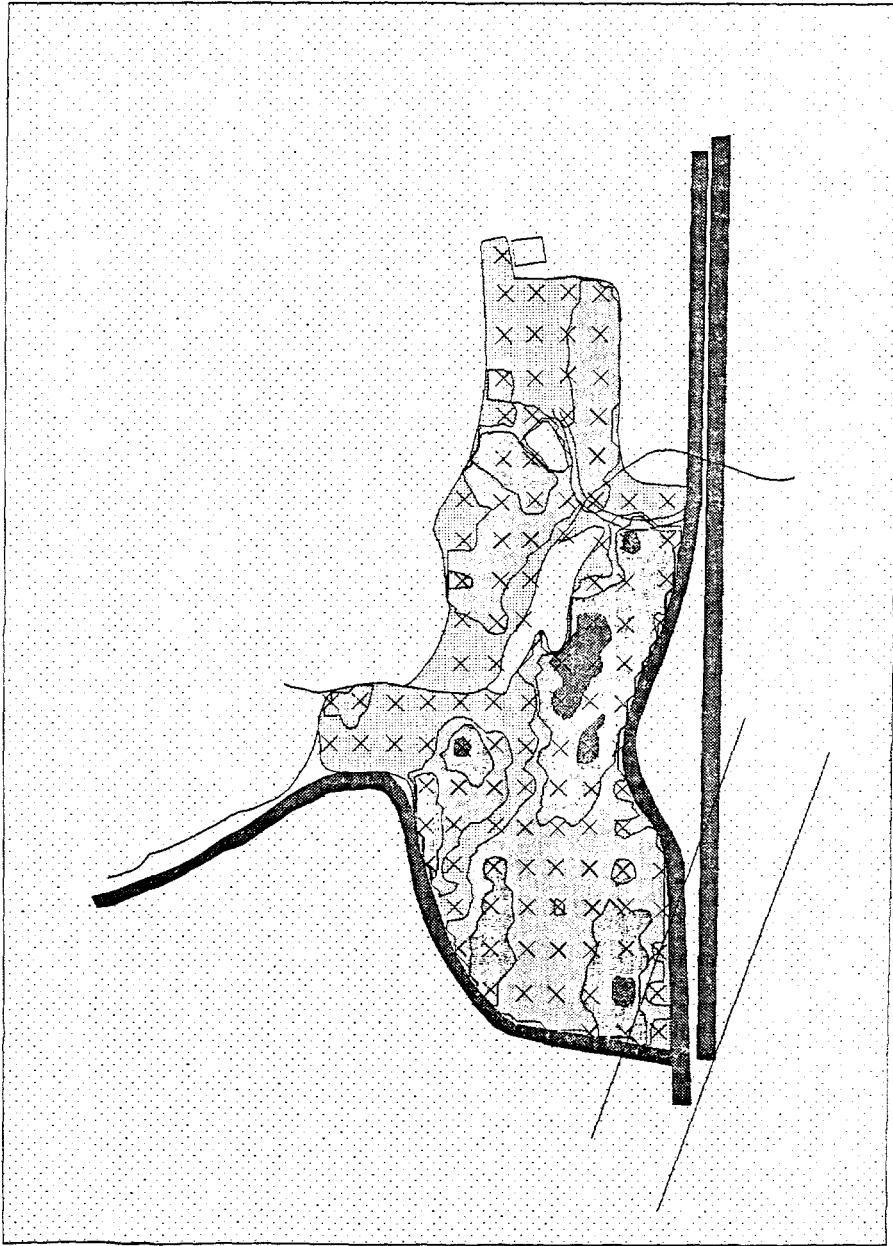
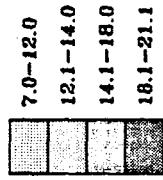


Fig. 8 Areal Distribution of Walkover Survey Readings

CO-60 Activity (PCi/g dry weight)
In the Top Soil Layer (0-3 inches deep)

ORNL-DWG 84-12872

30

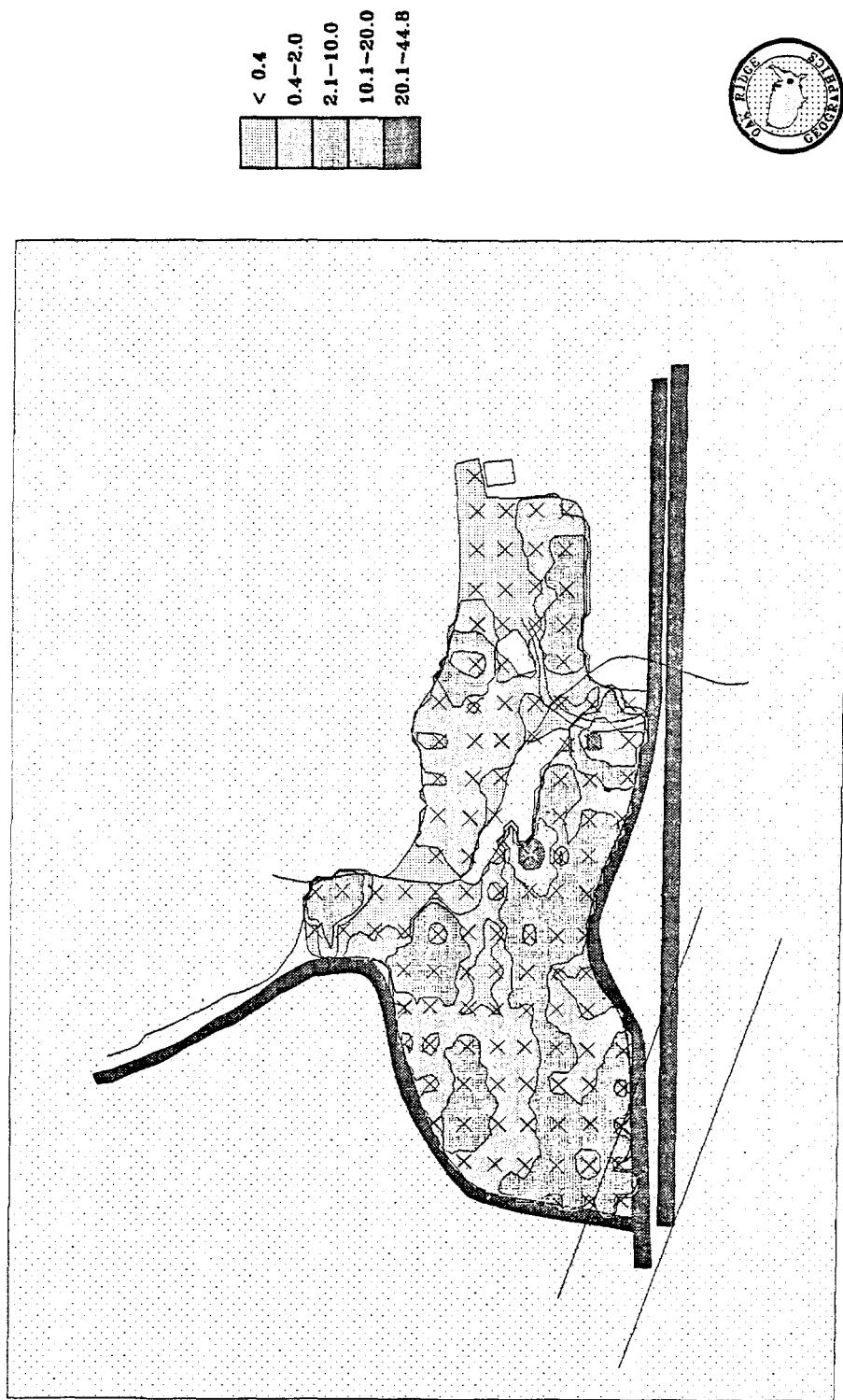


Fig. 9 Areal Distribution of Co-60
in Top Soil Layer

CS-137 Activity (Pci/g dry weight)
In the Top Soil Layer (0-3 inches deep)

ORNL-DWG 84-12873

31

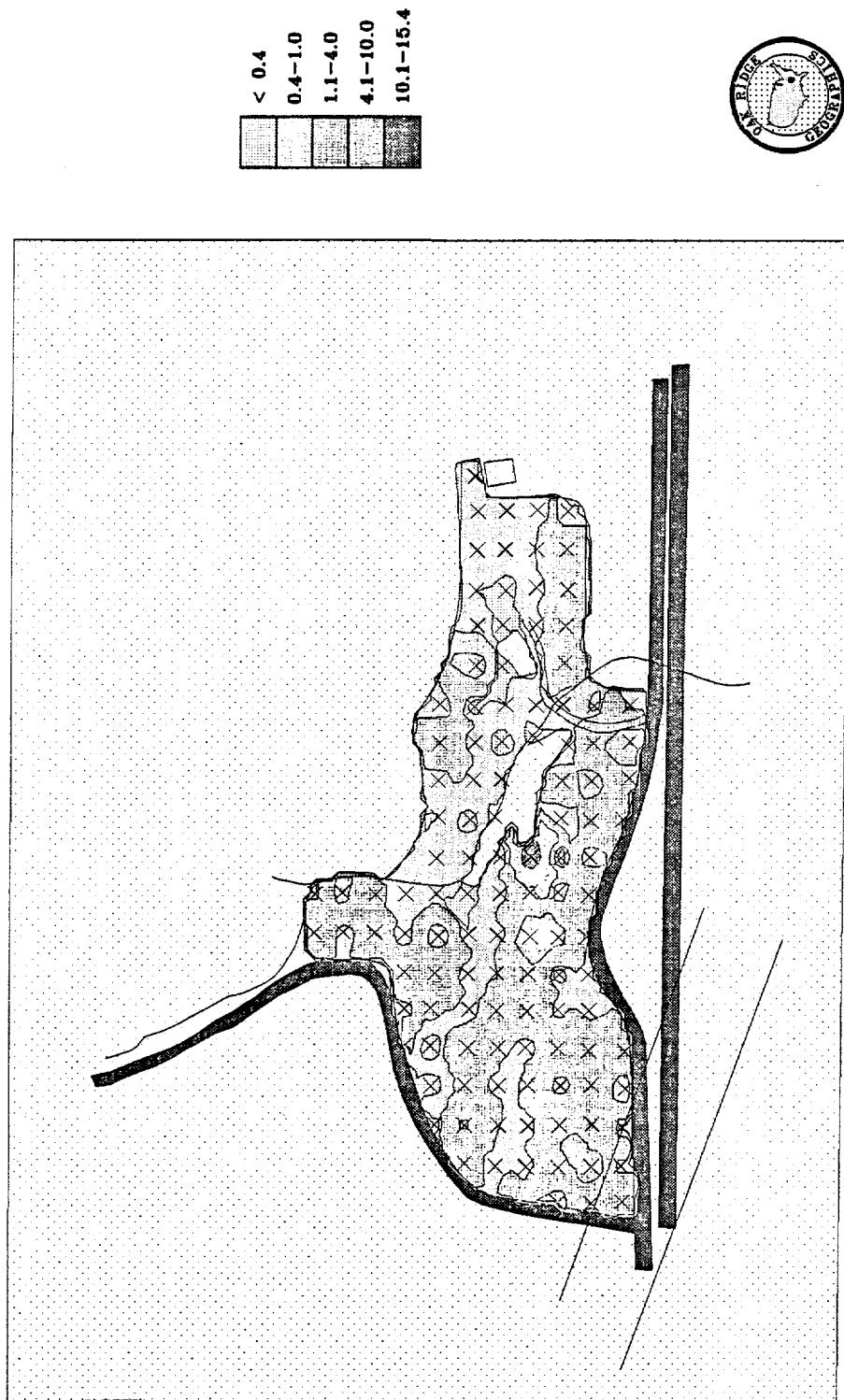


Fig. 10 Areal Distribution of Cs-137
in Top Soil Layer

**CO-60 Activity (PCi/g dry weight)
In the Middle Soil Layer (3-9 inches deep)**

ORNL-DWG 84-12874

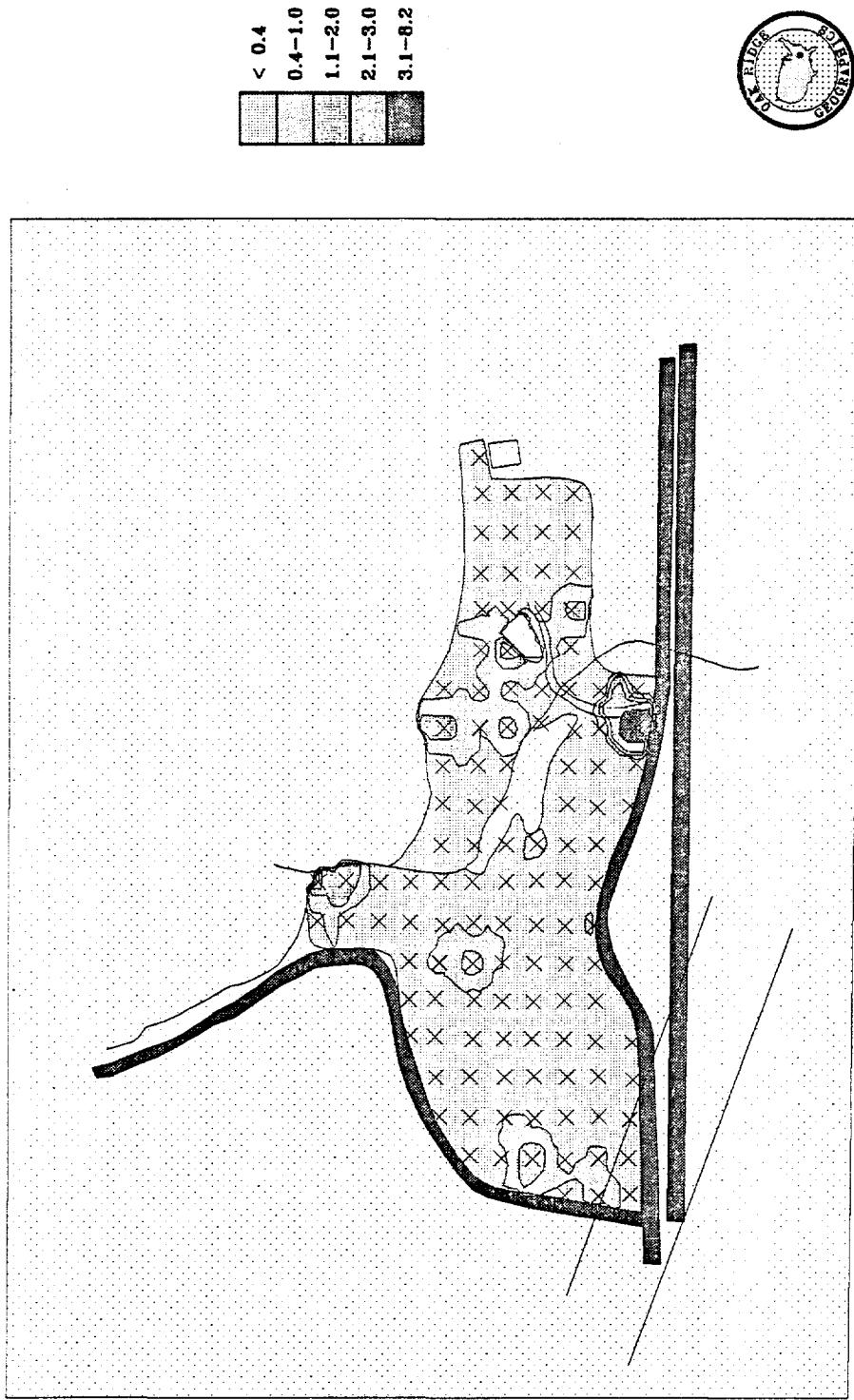


Fig. 11 Areal Distribution of Co-60
in Middle Soil Layer

CS-137 Activity (PCi/g dry weight)
In the Middle Soil Layer (3-9 inches deep)

ORNL-DWG 84-12875

33

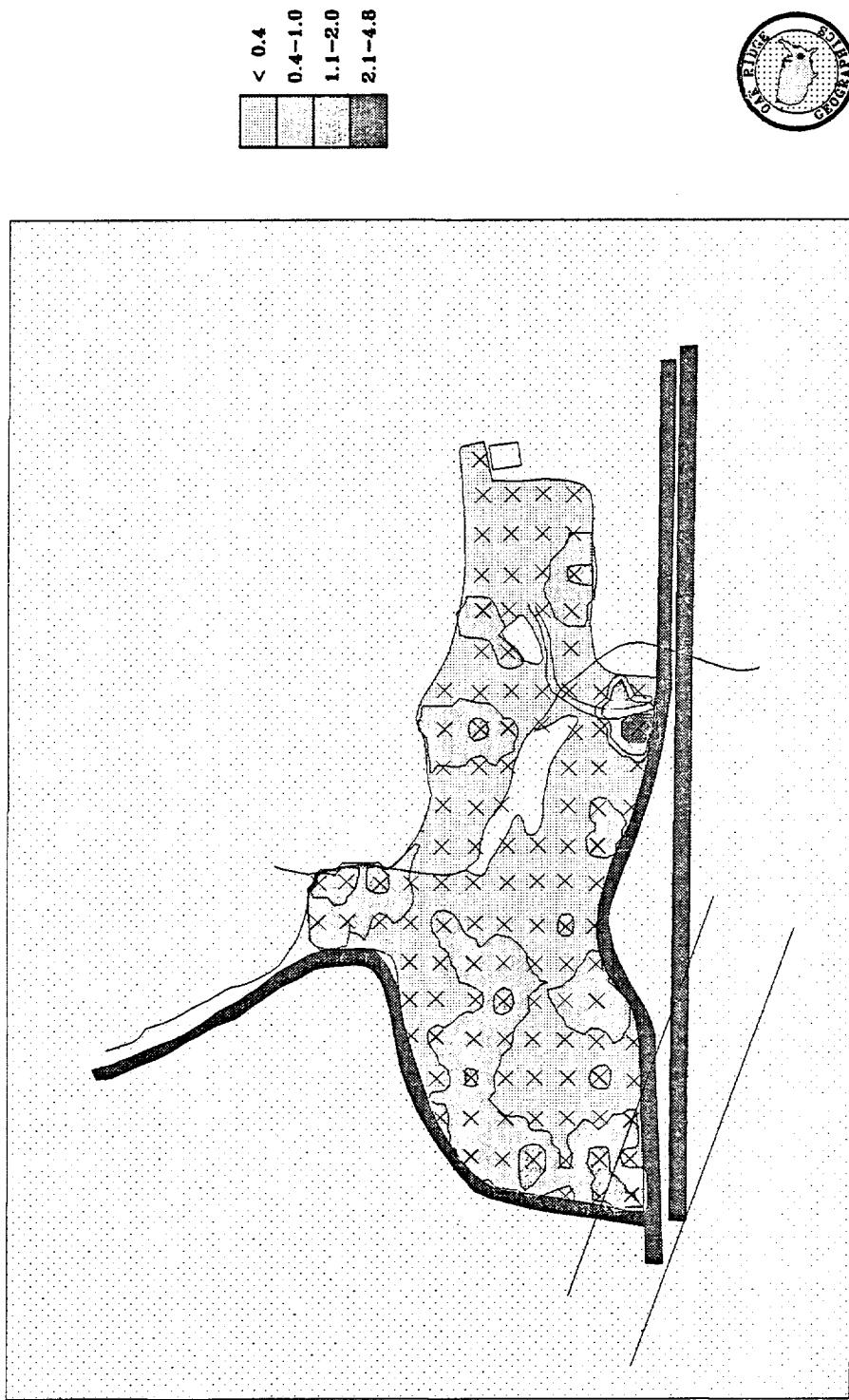


Fig. 12 Areal Distribution of Cs-137
in Middle Soil Layer

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APPENDIX A

Table 1A. Walkover Survey Readings
(Listed by transect number)

Transect Number	Station Number	Reading ($\mu\text{R}/\text{hr}$)
1	1	9.3
1	2	9.5
1	3	11.0
1	4	13.2
1	5	12.9
1	11	13.7
1	12	16.4
1	13	15.4
1	14	9.1
2	1	14.1
2	2	21.1
2	3	16.8
2	4	13.9
2	5	14.5
2	6	11.7
2	7	11.2
2	8	13.4
2	9	17.1
2	10	16.3
2	11	16.3
2	12	14.1
2	13	19.8
2	14	9.4
3	1	13.8
3	2	14.6
3	3	13.7
3	4	13.5
3	5	13.6
3	6	12.8
3	7	15.2
3	8	19.6
3	9	17.4
3	10	18.5
3	11	19.4
3	12	12.2
3	13	8.6
3	14	13.3
3	15	13.1
3	16	13.7
3	17	12.6
3	18	13.4
3	19	12.1

Table 1A. Walkover Survey Readings (Cont.)
(Listed by transect number)

Transect Number	Station Number	Reading ($\mu\text{R}/\text{hr}$)
4	2	12.3
4	3	12.6
4	4	11.9
4	5	13.4
4	6	13.4
4	7	17.6
4	8	16.6
4	9	19.7
4	10	18.4
4	13	9.7
4	14	12.4
4	16	11.8
4	17	12.0
4	18	12.0
4	19	11.1
5	2	12.1
5	3	13.3
5	4	12.8
5	5	13.5
5	6	12.9
5	7	10.9
5	8	10.4
5	9	10.3
5	11	9.6
5	12	10.7
5	13	12.8
5	14	15.8
5	15	14.4
5	16	12.4
5	17	9.8
5	18	9.7
5	19	11.0

Table 1A. Walkover Survey Readings (Cont.)
(Listed by transect number)

Transect Number	Station Number	Reading ($\mu\text{R}/\text{hr}$)
6	2	14.5
6	3	15.5
6	4	15.3
6	5	14.7
6	6	11.7
6	7	13.1
6	8	13.5
6	9	9.3
6	10	10.3
6	11	13.0
6	12	12.8
6	13	12.9
6	14	12.2
6	15	17.8
6	16	11.4
6	17	12.4
6	18	10.2
6	19	10.6
6	20	10.0
7	3	12.2
7	4	10.4
7	5	9.6
7	6	12.3
7	7	12.7
7	8	19.1
7	9	9.3
7	10	8.8
7	11	11.8
7	12	14.3
7	13	11.5
7	14	11.3
8	5	17.5
8	6	14.4
8	7	16.1
8	8	10.7
8	9	8.8
9	8	7.3
9	9	9.6
10	8	10.7
10	9	12.9
11	8	10.8
11	9	13.6

Table 2A. Walkover Survey Readings
(Ranked from highest to lowest reading)

Transect Number	Station Number	Reading ($\mu\text{R}/\text{hr}$)
2	2	21.1
2	13	19.8
4	9	19.7
3	8	19.6
3	11	19.4
7	8	19.1
3	10	18.5
4	10	18.4
6	15	17.8
4	7	17.6
8	5	17.5
3	9	17.4
2	9	17.1
2	3	16.8
4	8	16.6
1	12	16.4
2	10	16.3
2	11	16.3
8	7	16.1
5	14	15.8
6	3	15.5
1	13	15.4
6	4	15.3
3	7	15.2
6	5	14.7
3	2	14.6
2	5	14.5
6	2	14.5
5	15	14.4
8	6	14.4
7	12	14.3
2	1	14.1
2	12	14.1
2	4	13.9
3	1	13.8
1	11	13.7
3	3	13.7
3	16	13.7
3	5	13.6
11	9	13.6
3	4	13.5

Table 2A. Walkover Survey Readings (Cont.)
 (Ranked from highest to lowest reading)

Transect Number	Station Number	Reading (μ R/hr)
5	5	13.5
6	8	13.5
2	8	13.4
3	18	13.4
4	5	13.4
4	6	13.4
3	14	13.3
5	3	13.3
1	4	13.2
3	15	13.1
6	7	13.1
6	11	13.0
1	5	12.9
5	6	12.9
6	13	12.9
10	9	12.9
3	6	12.8
5	4	12.8
5	13	12.8
6	12	12.8
7	7	12.7
3	17	12.6
4	3	12.6
4	14	12.4
5	16	12.4
6	17	12.4
4	2	12.3
7	6	12.3
3	12	12.2
6	14	12.2
7	3	12.2
3	19	12.1
5	2	12.1
4	17	12.0
4	18	12.0
4	4	11.9
4	16	11.8
7	11	11.8
2	6	11.7
6	6	11.7

Table 2A. Walkover Survey Readings (Cont.)
 (Ranked from highest to lowest reading)

Transect Number	Station Number	Reading (μ R/hr)
7	13	11.5
6	16	11.4
7	14	11.3
2	7	11.2
4	19	11.1
1	3	11.0
5	19	11.0
5	7	10.9
11	8	10.8
5	12	10.7
8	8	10.7
10	8	10.7
6	19	10.6
5	8	10.4
7	4	10.4
5	9	10.3
6	10	10.3
6	18	10.2
6	20	10.0
5	17	9.8
4	13	9.7
5	18	9.7
5	11	9.6
7	5	9.6
9	9	9.6
1	2	9.5
2	14	9.4
1	1	9.3
6	9	9.3
7	9	9.3
1	14	9.1
7	10	8.8
8	9	8.8
3	13	8.6
9	8	7.3

Table 3A. Activities of Co-60, Top Soil Layer
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./ Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
1	1	764	1.28	<0.10		<0.13	
1	2	922	1.20	<0.20		<0.24	
1	3	827	1.20	<0.20		<0.24	
1	4	992	1.20	11.00	0.03	13.20	0.04
1	5	908	1.22	2.40	0.02	2.88	0.02
1	11	1361	1.28	1.40	0.01	1.82	0.01
1	12	1126	1.28	1.90	0.02	2.47	0.03
1	13	1004	1.44	10.00	0.03	14.00	0.04
1	14	1073	1.16	<0.10		<0.12	
2	1	1200	1.40	0.76	0.01	1.06	0.01
2	2	1071	1.32	14.00	0.05	18.20	0.07
2	3	1110	1.24	2.20	0.02	2.64	0.02
2	4	889	1.24	1.40	0.01	1.68	0.01
2	5	1024	1.30	1.10	0.01	1.43	0.01
2	6	1039	1.38	<0.10		<0.14	
2	7	882	1.26	<0.10		<0.13	
2	8	1194	1.22	4.40	0.02	5.28	0.02
2	9	775	1.26	3.70	0.02	4.81	0.03
2	10	817	1.24	7.70	0.03	9.24	0.04
2	11	882	1.22	1.80	0.01	2.16	0.01
2	12	1273	1.24	0.90	0.01	1.08	0.01
2	13	963	1.30	19.00	0.05	24.70	0.07
2	14	1006	1.16	<0.10		<0.12	
3	1	1189	1.26	9.00	0.03	11.70	0.04
3	2	1140	1.28	2.70	0.02	3.51	0.03
3	3	1187	1.24	4.80	0.02	5.76	0.02
3	4	1044	1.24	1.23	0.01	1.48	0.01
3	5	1212	1.26	3.10	0.02	4.03	0.03
3	6	1050	1.36	0.62	0.01	0.87	0.01
3	7	1115	1.38	0.25	0.06	0.35	0.08
3	8	1061	1.36	6.40	0.03	8.96	0.04
3	9	1097	1.20	1.65	0.47	1.98	0.56
3	10	1286	1.34	0.06	0.03	0.08	0.04
3	11	1092	1.28	1.63	0.18	2.12	0.23
3	12	1390	1.30	3.41	0.70	4.43	0.91
3	13	1270	1.24	<0.10		<0.12	
3	14	1198	1.54	<0.20		<0.30	
3	15	968	1.42	2.22	0.54	3.11	0.76
3	16	1145	1.24	4.86	0.81	5.83	0.97
3	17	806	1.44	2.57	0.65	3.60	0.91
3	18	947	1.24	3.90	0.02	4.68	0.02
3	19	1120	1.26	0.19	0.17	0.25	0.22

Table 3A. Activities of Co-60, Top Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./ Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
4	2	1004	1.32	1.14	0.41	1.48	0.53
4	3	1407	1.20	0.56	0.30	0.67	0.36
4	4	1187	1.22	1.00	0.01	1.20	0.01
4	5	1064	1.26	0.42	0.25	0.55	0.33
4	6	927	1.24	1.60	0.01	1.92	0.01
4	7	1051	1.30	4.00	0.02	5.20	0.03
4	8	902	1.34	8.80	0.03	11.44	0.04
4	9	1182	1.36	6.49	0.81	9.09	1.13
4	10	1030	1.38	32.00	0.08	44.80	0.11
4	13	1270	1.18	<0.10		<0.12	
4	14	1215	1.36	<0.20		<0.28	
4	16	1125	1.24	<0.10		<0.12	
4	17	1169	1.34	<0.10		<0.13	
4	18	1170	1.32	0.50	0.01	0.65	0.01
4	19	1135	1.28	0.38	0.24	0.49	0.31
5	2	1124	1.42	0.49	0.22	0.69	0.31
5	3	1152	1.26	1.10	0.01	1.43	0.01
5	4	1282	1.28	0.65	0.27	0.85	0.35
5	5	999	1.24	1.00	0.01	1.20	0.01
5	6	991	1.28	<0.20		<0.26	
5	7	1047	1.28	<0.10		<0.13	
5	8	1292	1.24	<0.10		<0.12	
5	9	1463	1.28	<0.24		<0.31	
5	10	952	1.38	<0.16		<0.22	
5	11	1425	1.26	<0.16		<0.21	
5	12	1341	1.36	<0.15		<0.21	
5	13	1370	1.40	1.32	0.41	1.85	0.57
5	14	1309	1.32	0.64	0.29	0.83	0.38
5	15	1107	1.12	0.21	0.18	0.23	0.20
5	16	1218	1.34	<0.18		<0.23	
5	17	1104	1.28	<0.10		<0.13	
5	18	1187	1.32	<0.18		<0.23	
5	19	1031	1.32	<0.19		<0.25	

Table 3A. Activities of Co-60, Top Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./ Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
6	2	897	1.24	0.84	0.01	1.01	0.01
6	3	877	1.20	5.60	0.02	6.72	0.02
6	4	991	1.30	2.50	0.02	3.25	0.03
6	5	951	1.30	2.60	0.02	3.38	0.03
6	6	1110	1.38	0.22		0.31	
6	7	942	1.28	0.31	0.01	0.40	0.01
6	8	1228	1.28	0.68	0.01	0.88	0.01
6	9	921	1.30	0.10		0.13	
6	10	1269	1.28	0.68	0.32	0.88	0.42
6	11	1182	1.38	0.81	0.01	1.13	0.01
6	12	980	1.38	0.33	0.00	0.46	0.00
6	13	796	1.22	0.49	0.01	0.59	0.01
6	14	1059	1.28	0.26	0.20	0.34	0.26
6	15	1131	1.82	8.80	0.03	15.84	0.05
6	16	928	1.28	1.03	0.41	1.34	0.53
6	17	1117	1.24	0.19	0.14	0.23	0.17
6	18	895	1.32	0.16		0.21	
6	19	998	1.24	0.10		0.12	
6	20	867	1.18	0.14		0.17	
7	3	1101	1.20	0.32	0.24	0.38	0.29
7	4	1140	1.24	0.20		0.24	
7	5	1195	1.26	0.11		0.14	
7	6	737	1.34	0.97	0.38	1.26	0.49
7	7	1000	1.44	4.05	0.81	5.67	1.13
7	8	1027	1.38	9.50	0.03	13.30	0.04
7	9	143	1.08	0.10		0.11	
7	10	1013	1.34	0.20		0.26	
7	11	1394	1.30	1.08	0.35	1.40	0.46
7	12	1313	1.36	0.20	0.01	0.28	0.01
7	13	911	1.30	1.70	0.01	2.21	0.01
7	14	1266	1.32	0.35	0.22	0.46	0.29
8	5	1196	1.28	2.03	0.54	2.64	0.70
8	6	1100	1.40	0.23	0.00	0.32	0.00
8	7	1238	1.44	3.78	0.81	5.29	1.13
8	8	1288	1.30	0.10		0.13	
8	9	1010	1.14	0.10		0.11	
9	8	1264	1.36	0.20		0.28	
9	9	941	1.00	0.10		0.10	
10	8	1316	1.26	0.10		0.13	
10	9	725	1.40	5.6	0.03	7.84	0.04
11	8	989	1.28	0.2		0.26	
11	9	861	1.32	6.2	0.03	8.06	0.04

Table 4A. Activities of Cs-137, Top Soil Layer
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./ Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
1	1	764	1.28	0.84	0.01	1.09	0.01
1	2	922	1.20	0.50	0.01	0.60	0.01
1	3	827	1.20	0.29	0.01	0.35	0.01
1	4	992	1.20	5.60	0.02	6.72	0.02
1	5	908	1.22	1.50	0.01	1.80	0.01
1	11	1361	1.28	1.10	0.01	1.43	0.01
1	12	1126	1.28	1.40	0.01	1.82	0.01
1	13	1004	1.44	5.80	0.02	8.12	0.03
1	14	1073	1.16	0.66	0.01	0.79	0.01
2	1	1200	1.40	0.92	0.01	1.29	0.01
2	2	1071	1.32	5.40	0.02	7.02	0.03
2	3	1110	1.24	1.90	0.01	2.28	0.01
2	4	889	1.24	1.40	0.01	1.68	0.01
2	5	1024	1.30	0.92	0.01	1.20	0.01
2	6	1039	1.38	0.63	0.01	0.88	0.01
2	7	882	1.26	0.48	0.01	0.62	0.01
2	8	1194	1.22	2.30	0.01	2.76	0.01
2	9	775	1.26	2.20	0.01	2.86	0.01
2	10	817	1.24	4.00	0.02	4.80	0.02
2	11	882	1.22	1.30	0.01	1.56	0.01
2	12	1273	1.24	0.54	0.01	0.65	0.01
2	13	963	1.30	2.60	0.02	3.38	0.03
2	14	1006	1.16	0.24	0.01	0.29	0.01
3	1	1189	1.26	4.10	0.02	5.33	0.03
3	2	1140	1.28	2.40	0.01	3.12	0.01
3	3	1187	1.24	2.90	0.02	3.48	0.02
3	4	1044	1.24	0.68	0.01	0.82	0.01
3	5	1212	1.26	2.40	0.01	3.12	0.01
3	6	1050	1.36	0.55	0.00	0.77	0.00
3	7	1115	1.38	0.15	0.04	0.21	0.06
3	8	1061	1.36	3.30	0.02	4.62	0.03
3	9	1097	1.20	0.37	0.25	0.44	0.30
3	10	1286	1.34	0.07	0.03	0.09	0.04
3	11	1092	1.28	0.61	0.09	0.79	0.12
3	12	1390	1.30	1.46	0.38	1.90	0.49
3	13	1270	1.24	0.41	0.00	0.49	0.00
3	14	1198	1.54	0.63	0.01	0.95	0.02
3	15	968	1.42	1.30	0.35	1.82	0.49
3	16	1145	1.24	2.11	0.49	2.53	0.59
3	17	806	1.44	2.08	0.51	2.91	0.71
3	18	947	1.24	2.00	0.01	2.40	0.01
3	19	1120	1.26	0.30	0.22	0.39	0.29

Table 4A. Activities of Cs-137, Top Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./ Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
4	2	1004	1.32	0.65	0.24	0.85	0.31
4	3	1407	1.20	0.59	0.26	0.71	0.31
4	4	1187	1.22	0.99	0.01	1.19	0.01
4	5	1064	1.26	0.50	0.25	0.65	0.33
4	6	927	1.24	1.80	0.01	2.16	0.01
4	7	1051	1.30	2.50	0.01	3.25	0.01
4	8	902	1.34	5.60	0.02	7.28	0.03
4	9	1182	1.36	2.65	0.49	3.71	0.69
4	10	1030	1.38	11.00	0.03	15.40	0.04
4	13	1270	1.18	<0.20		<0.24	
4	14	1215	1.36	0.43	0.01	0.60	0.01
4	16	1125	1.24	0.58	0.01	0.70	0.01
4	17	1169	1.34	0.43	0.01	0.56	0.01
4	18	1170	1.32	0.76	0.01	0.99	0.01
4	19	1135	1.28	0.41	0.22	0.53	0.29
5	2	1124	1.42	0.43	0.22	0.60	0.31
5	3	1152	1.26	0.81	0.01	1.05	0.01
5	4	1282	1.28	0.41	0.22	0.53	0.29
5	5	999	1.24	1.10	0.01	1.32	0.01
5	6	991	1.28	1.70	0.01	2.21	0.01
5	7	1047	1.28	0.78	0.01	1.01	0.01
5	8	1292	1.24	0.47	0.01	0.56	0.01
5	9	1463	1.28	0.46	0.24	0.60	0.31
5	10	952	1.38	0.45	0.26	0.63	0.36
5	11	1425	1.26	0.22	0.15	0.29	0.20
5	12	1341	1.36	0.31	0.15	0.43	0.21
5	13	1370	1.40	1.04	0.31	1.46	0.43
5	14	1309	1.32	0.29	0.16	0.38	0.21
5	15	1107	1.12	0.30	0.21	0.33	0.23
5	16	1218	1.34	<0.14		<0.18	
5	17	1104	1.28	0.26	0.01	0.34	0.01
5	18	1187	1.32	0.29	0.19	0.38	0.25
5	19	1031	1.32	0.36	0.19	0.47	0.25

Table 4A. Activities of Cs-137, Top Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./ Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
6	2	897	1.24	1.40	0.01	1.68	0.01
6	3	877	1.20	3.40	0.02	4.08	0.02
6	4	991	1.30	1.30	0.01	1.69	0.01
6	5	951	1.30	1.90	0.01	2.47	0.01
6	6	1110	1.38	0.35	0.19	0.49	0.27
6	7	942	1.28	0.49	0.01	0.64	0.01
6	8	1228	1.28	0.33	0.00	0.43	0.00
6	9	921	1.30	0.21	0.00	0.27	0.00
6	10	1269	1.28	0.81	0.27	1.05	0.35
6	11	1182	1.38	0.81	0.01	1.13	0.01
6	12	980	1.38	0.59	0.01	0.83	0.01
6	13	796	1.22	0.63	0.01	0.76	0.01
6	14	1059	1.28	0.25	0.17	0.33	0.22
6	15	1131	1.82	3.30	0.02	5.94	0.04
6	16	928	1.28	0.59	0.24	0.77	0.31
6	17	1117	1.24	0.32	0.19	0.38	0.23
6	18	895	1.32	0.54	0.22	0.70	0.29
6	19	998	1.24	0.45	0.00	0.54	0.00
6	20	867	1.18	0.38	0.22	0.46	0.26
7	3	1101	1.20	0.21	0.17	0.25	0.20
7	4	1140	1.24	0.20		0.24	
7	5	1195	1.26	0.11		0.14	
7	6	737	1.34	0.97	0.32	1.26	0.42
7	7	1000	1.44	1.92	0.04	2.69	0.06
7	8	1027	1.38	4.00	0.02	5.60	0.03
7	9	143	1.08	0.39	0.01	0.43	0.01
7	10	1013	1.34	0.62	0.01	0.81	0.01
7	11	1394	1.30	0.78	0.24	1.01	0.31
7	12	1313	1.36	0.51	0.01	0.71	0.01
7	13	911	1.30	2.00	0.01	2.60	0.01
7	14	1266	1.32	0.46	0.19	0.60	0.25
8	5	1196	1.28	1.03	0.32	1.34	0.42
8	6	1100	1.40	0.67	0.01	0.94	0.01
8	7	1238	1.44	1.19	0.32	1.67	0.45
8	8	1288	1.30	0.46	0.01	0.60	0.01
8	9	1010	1.14	0.33	0.01	0.36	0.01
9	8	1264	1.36	1.10	0.01	1.54	0.01
9	9	941	1.00	1.40	0.01	1.40	0.01
10	8	1316	1.26	0.56	0.01	0.73	0.01
10	9	725	1.40	3.40	0.02	4.76	0.03
11	8	989	1.28	1.10	0.01	1.43	0.01
11	9	861	1.32	3.20	0.02	4.16	0.03

Table 5A. Activities of Co-60, Middle Soil Layer
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
1	1	1897.0	1.22	0.10		0.12	
1	2	1921.0	1.24	0.10		0.12	
1	3	2830.0	1.14	0.10		0.11	
1	4	3108.0	1.24	0.30		0.36	
1	5	1528.0	1.22	0.20		0.24	
1	11	1795.0	1.28	0.10		0.13	
1	12	1060.0	1.30	0.10		0.13	
1	13	2002.0	1.20	6.80	0.02	8.16	0.02
1	14	986.0	1.10	0.20		0.22	
2	1	2101.0	1.32	0.66	0.01	0.86	0.01
2	2	1650.0	1.20	0.40		0.48	
2	3	1440.0	1.28	0.10		0.13	
2	4	1607.0	1.28	0.10		0.13	
2	5	1600.0	1.30	0.10		0.13	
2	6	1572.0	1.28	0.30		0.39	
2	7	2930.0	1.28	0.10		0.13	
2	8	1469.0	1.24	0.47	0.01	0.56	0.01
2	9	1608.0	1.18	0.10		0.12	
2	10	2502.0	1.38	0.30		0.42	
2	11	1465.0	1.14	0.20		0.22	
2	12	1688.0	1.22	0.20		0.24	
2	13	1474.0	1.20	0.30		0.36	
2	14	1619.0	1.16	0.10		0.12	
3	1	2067.0	1.18	0.10		0.12	
3	2	2029.0	1.18	0.20		0.24	
3	3	2435.0	1.20	0.10		0.12	
3	4	2664.0	1.18	0.10		0.12	
3	5	1966.0	1.20	0.10		0.12	
3	6	2326.0	1.34	0.10		0.13	
3	7	2487.0	1.26	0.02		0.03	
3	8	787.1	1.22	0.20		0.24	
3	9	1842.0	1.18	*		*	
3	10	1016.0	1.20	0.02		0.02	
3	11	1035.0	1.20	0.03	0.02	0.04	0.02
3	12	967.0	1.24	0.22		0.26	
3	13	1277.0	1.16	0.10		0.12	
3	14	1074.0	1.36	0.10		0.14	
3	15	1198.0	1.38	0.19		0.27	
3	16	1004.0	1.38	0.84	0.38	1.18	0.53
3	17	1122.0	1.34	0.14		0.18	
3	18	1104.0	1.18	0.30		0.36	
3	19	993.0	1.22	0.14		0.17	

Table 5A. Activities of Co-60, Middle Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./ Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
4	2	2749.0	1.20	1.56	0.09	1.87	0.11
4	3	2885.0	1.20	0.21		0.25	
4	4	2391.0	1.22	0.10		0.12	
4	5	2321.0	1.18	0.15		0.18	
4	6	2335.0	1.18	0.10		0.12	
4	7	1787.0	1.22	0.20		0.24	
4	8	864.0	1.18	0.30		0.36	
4	9	1259.0	1.24	0.22		0.26	
4	10	1780.0	1.26	0.50	0.01	0.65	0.01
4	13	1194.0	1.16	0.20		0.24	
4	14	1120	1.28	0.10		0.13	
4	16	1151	1.24	0.20		0.24	
4	17	865	1.34	0.10		0.13	
4	18	1354	1.34	0.20		0.26	
4	19	1069	1.22	0.16		0.19	
5	2	1322	1.26	0.19		0.25	
5	3	1998	1.22	0.30		0.36	
5	4	1800	1.20	0.11		0.13	
5	5	1710	1.24	0.10		0.12	
5	6	1640	1.34	0.10		0.13	
5	7	1391	1.26	0.30		0.39	
5	8	1155	1.22	0.10		0.12	
5	9	1023	1.20	0.24		0.29	
5	10	873	1.14	0.26		0.29	
5	11	1175	1.16	0.19		0.23	
5	12	1156	1.24	0.21		0.25	
5	13	1095	1.18	1.11	0.38	1.33	0.46
5	14	1231	1.16	0.15		0.18	
5	15	992	1.38	1.79	0.55	2.51	0.77
5	16	1002	1.22	0.15		0.18	
5	17	931	1.14	0.10		0.11	
5	18	839	1.20	0.14		0.17	
5	19	1129	1.28	0.16		0.21	

Table 5A. Activities of Co-60, Middle Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./ Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
6	2	1560	1.28	<0.10		<0.13	
6	3	1501	1.26	<0.20		<0.26	
6	4	1547	1.30	0.33	0.01	0.43	0.01
6	5	1861	1.18	<0.10		<0.12	
6	6	1602	1.28	<0.16		<0.21	
6	7	1698	1.32	1.10	0.01	1.43	0.01
6	8	1520	1.26	<0.10		<0.13	
6	9	1663	1.22	<0.10		<0.12	
6	10	1921	1.16	<0.19		<0.23	
6	11	1763	1.20	<0.20		<0.24	
6	12	2056	1.14	<0.20		<0.22	
6	13	1658	1.26	<0.30		<0.39	
6	14	1831	1.18	<0.19		<0.23	
6	15	1563	1.24	<0.10		<0.12	
6	16	1210	1.26	0.25	0.21	0.33	0.27
6	17	1810	1.26	0.15	0.13	0.20	0.17
6	18	1419	1.32	<0.16		<0.21	
6	19	1491	1.18	<0.10		<0.12	
6	20	1200	1.20	<0.14		<0.17	
7	3	928	1.22	<0.14		<0.17	
7	4	1896	1.20	<0.20		<0.24	
7	5	1585	1.32	<0.16		<0.21	
7	6	1780	1.26	0.18	0.14	0.23	0.18
7	7	1796	1.36	0.38	0.24	0.53	0.34
7	8	1003	1.38	<0.20		<0.28	
7	9	837	1.22	<0.10		<0.12	
7	10	1300	1.18	<0.10		<0.12	
7	11	1066	1.24	<0.19		<0.23	
7	12	1746	1.28	<0.10		<0.13	
7	13	1362	1.34	1.20	0.01	1.56	0.01
7	14	1128	1.36	<0.14		<0.20	
8	5	1046	1.20	<0.19		<0.23	
8	6	1208	1.32	<0.20		<0.26	
8	7	1102	1.32	0.32	0.22	0.42	0.29
8	8	1398	1.22	<0.20		<0.24	
8	9	1330	1.22	<0.10		<0.12	
9	8	1064	1.28	<0.10		<0.13	
9	9	1259	1.24	<0.10		<0.12	
10	8	1094	1.08	<0.10		<0.11	
10	9	1327	1.26	1.40	0.02	1.82	0.03
11	8	970	1.30	<0.10		<0.13	
11	9	1084	1.22	1.80	0.01	2.76	0.01

* Activity not reported

Table 6A. Activities of Cs-137, Middle Soil Layer
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
1	1	1897	1.22	0.86	0.01	1.03	0.01
1	2	1921	1.24	< 0.10		< 0.12	
1	3	2830	1.14	0.45	0.00	0.50	0.00
1	4	3108	1.24	< 0.20		< 0.24	
1	5	1528	1.22	0.25	0.01	0.30	0.01
1	11	1795	1.28	0.27	0.00	0.35	0.00
1	12	1060	1.30	< 0.20		< 0.26	
1	13	2002	1.20	4.00	0.02	4.80	0.02
1	14	986	1.10	< 0.20		< 0.22	
2	1	2101	1.32	0.92	0.01	1.20	0.01
2	2	1650	1.20	1.10	0.01	1.32	0.01
2	3	1440	1.28	< 0.20		< 0.26	
2	4	1607	1.28	0.36	0.01	0.47	0.01
2	5	1600	1.30	< 0.20		< 0.26	
2	6	1572	1.28	0.66	0.01	0.86	0.01
2	7	2930	1.28	0.54	0.01	0.70	0.01
2	8	1469	1.24	0.23	0.01	0.28	0.01
2	9	1608	1.18	< 0.20		< 0.24	
2	10	2502	1.38	0.41	0.01	0.57	0.01
2	11	1465	1.14	0.42	0.01	0.46	0.01
2	12	1688	1.22	< 0.20		< 0.24	
2	13	1474	1.20	0.29	0.01	0.35	0.01
2	14	1619	1.16	< 0.20		< 0.24	
3	1	2067	1.18	< 0.20		< 0.24	
3	2	2029	1.18	0.22	0.01	0.26	0.01
3	3	2435	1.20	< 0.10		< 0.12	
3	4	2664	1.18	< 0.10		< 0.12	
3	5	1966	1.20	< 0.10		< 0.12	
3	6	2326	1.34	0.45	0.01	0.59	0.01
3	7	2487	1.26	0.02	0.01	0.03	0.01
3	8	787	1.22	0.39	0.01	0.47	0.01
3	9	1842	1.18	< 0.14		< 0.17	
3	10	1016	1.20	< 0.01		< 0.01	
3	11	1035	1.20	< 0.02		< 0.02	
3	12	967	1.24	< 0.16		< 0.19	
3	13	1277	1.16	< 0.20		< 0.24	
3	14	1074	1.36	< 0.20		< 0.28	
3	15	1198	1.38	< 0.16		< 0.22	
3	16	1004	1.38	0.51	0.24	0.71	0.34
3	17	1122	1.34	0.89	0.35	1.16	0.46
3	18	1104	1.18	< 0.30		< 0.36	
3	19	993	1.22	0.23	0.19	0.28	0.23

Table 6A. Activities of Cs-137, Middle Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./ Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
4	2	2749	1.20	1.56	0.10	1.87	0.12
4	3	2885	1.20	<0.11		<0.13	
4	4	2391	1.22	0.20	0.00	0.24	0.00
4	5	2321	1.18	0.11	0.10	0.13	0.12
4	6	2335	1.18	0.28	0.01	0.34	0.01
4	7	1787	1.22	0.26	0.00	0.31	0.00
4	8	864	1.18	<0.20		<0.24	
4	9	1259	1.24	0.14	0.13	0.17	0.16
4	10	1780	1.26	<0.20		<0.26	
4	13	1194	1.16	<0.20		<0.24	
4	14	1120	1.28	<0.20		<0.26	
4	16	1151	1.24	<0.20		<0.24	
4	17	865	1.34	<0.20		<0.26	
4	18	1354	1.34	<0.20		<0.26	
4	19	1069	1.22	<0.11		<0.13	
5	2	1322	1.26	0.38	0.22	0.49	0.29
5	3	1998	1.22	0.34	0.01	0.41	0.01
5	4	1800	1.20	<0.11		<0.13	
5	5	1710	1.24	0.42	0.01	0.50	0.01
5	6	1640	1.34	1.00	0.01	1.30	0.01
5	7	1391	1.26	0.66	0.01	0.86	0.01
5	8	1155	1.22	<0.20		<0.24	
5	9	1023	1.20	<0.24		<0.29	
5	10	873	1.14	0.16	0.16	0.18	0.18
5	11	1175	1.16	<0.14		<0.17	
5	12	1156	1.24	<0.13		<0.16	
5	13	1095	1.18	0.38	0.20	0.46	0.24
5	14	1231	1.16	<0.12		<0.14	
5	15	992	1.38	0.53	0.29	0.74	0.41
5	16	1002	1.22	<0.14		<0.17	
5	17	931	1.14	<0.10		<0.11	
5	18	839	1.20	0.24	0.21	0.29	0.25
5	19	1129	1.28	<0.14		<0.18	

Table 6A. Activities of Cs-137, Middle Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Weight (g Wet Wt.)	Ratio Wet Wt./ Dry Wt.	Activity (pCi/g)			
				pCi/g Wet Wt.	Uncertainty pCi/g Wet Wt.	pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
6	2	1560	1.28	0.54	0.01	0.70	0.01
6	3	1501	1.26	0.57	0.01	0.74	0.01
6	4	1547	1.30	0.85	0.01	1.11	0.01
6	5	1861	1.18	0.64	0.01	0.77	0.01
6	6	1602	1.28	<0.16		<0.21	
6	7	1698	1.32	0.58	0.01	0.75	0.01
6	8	1520	1.26	<0.10		<0.13	
6	9	1663	1.22	<0.20		<0.24	
6	10	1921	1.16	<0.16		<0.19	
6	11	1763	1.20	<0.10		<0.12	
6	12	2056	1.14	<0.20		<0.22	
6	13	1658	1.26	0.97	0.01	1.26	0.01
6	14	1831	1.18	<0.14		<0.17	
6	15	1563	1.24	<0.20		<0.24	
6	16	1210	1.26	0.57	0.24	0.74	0.31
6	17	1810	1.26	0.16	0.15	0.21	0.20
6	18	1419	1.32	<0.24		<0.31	
6	19	1491	1.18	0.16	0.01	0.19	0.01
6	20	1200	1.20	0.24	0.15	0.29	0.18
7	3	928	1.22	0.14	0.13	0.17	0.16
7	4	1896	1.20	<0.10		<0.12	
7	5	1585	1.32	0.35	0.19	0.46	0.25
7	6	1780	1.26	0.15	0.13	0.20	0.17
7	7	1796	1.36	0.16	0.15	0.22	0.21
7	8	1003	1.38	0.42	0.01	0.59	0.01
7	9	837	1.22	0.23	0.00	0.28	0.00
7	10	1300	1.18	0.19	0.00	0.23	0.00
7	11	1066	1.24	<0.14		<0.17	
7	12	1746	1.28	<0.30		<0.39	
7	13	1362	1.34	0.77	0.01	1.00	0.01
7	14	1128	1.36	<0.11		<0.15	
8	5	1046	1.20	<0.14		<0.17	
8	6	1208	1.32	0.19	0.00	0.25	0.00
8	7	1102	1.32	<0.19		<0.25	
8	8	1398	1.22	<0.20		<0.24	
8	9	1330	1.22	0.30	0.00	0.36	0.00
9	8	1064	1.28	<0.20		<0.26	
9	9	1259	1.24	1.10	0.01	1.32	0.01
10	8	1094	1.08	0.33	0.01	0.36	0.01
10	9	1327	1.26	0.88	0.01	1.14	0.01
11	8	970	1.30	0.60	0.01	0.78	0.01
11	9	1084	1.22	1.30	0.01	1.56	0.01

Table 7A. Activities of Co-60, Top Soil Layer
 (Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Dry Wt.)
4	10	44.80
2	13	24.70
2	2	18.20
6	15	15.84
1	13	14.00
7	8	13.30
1	4	13.20
3	1	11.70
4	8	11.44
2	10	9.24
4	9	9.09
3	8	8.96
11	9	8.06
10	9	7.84
6	3	6.72
3	16	5.83
3	3	5.76
7	7	5.67
8	7	5.29
2	8	5.28
4	7	5.20
2	9	4.81
3	18	4.68
3	12	4.43
3	5	4.03
3	17	3.60
3	2	3.51
6	5	3.38
6	4	3.25
3	15	3.11
1	5	2.88
2	3	2.64
8	5	2.64
1	12	2.47
7	13	2.21
2	11	2.16
3	11	2.12
3	9	1.98
4	6	1.92
5	13	1.85

Table 7A. Activities of Co-60, Top Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Dry Wt.)
1	11	1.82
2	4	1.68
3	4	1.48
4	2	1.48
2	5	1.43
5	3	1.43
7	11	1.40
6	16	1.34
7	6	1.26
4	4	1.20
5	5	1.20
6	11	1.13
2	12	1.08
2	1	1.06
6	2	1.01
6	8	0.88
6	10	0.88
3	6	0.87
5	4	0.85
5	14	0.83
5	2	0.69
4	3	0.67
4	18	0.65
6	13	0.59
4	5	0.55
4	19	0.49
6	12	0.46
7	14	0.46
6	7	0.40
7	3	0.38
3	7	0.35
6	14	0.34
8	6	0.32
5	9	<0.31
6	6	<0.31
3	14	<0.30
4	14	<0.28
7	12	0.28
9	8	<0.28

Table 7A. Activities of Co-60, Top Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Dry Wt.)
5	6	<0.26
7	10	<0.26
11	8	<0.26
3	19	0.25
5	19	<0.25
1	2	<0.24
1	3	<0.24
7	4	<0.24
5	15	0.23
5	16	<0.23
5	18	<0.23
6	17	0.23
5	10	<0.22
5	11	<0.21
5	12	<0.21
6	18	<0.21
6	20	<0.17
2	6	<0.14
7	5	<0.14
1	1	<0.13
2	7	<0.13
4	17	<0.13
5	7	<0.13
5	17	<0.13
6	9	<0.13
8	8	<0.13
10	8	<0.13
1	14	<0.12
2	14	<0.12
3	13	<0.12
4	13	<0.12
4	16	<0.12
5	8	<0.12
6	19	<0.12
7	9	<0.11
8	9	<0.11
9	9	<0.10
3	10	0.08

Table 8A. Activities of Cs-137, Top Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Dry Wt.)
4	10	15.40
1	13	8.12
4	8	7.28
2	2	7.02
1	4	6.72
6	15	5.94
7	8	5.60
3	1	5.33
2	10	4.80
10	9	4.76
3	8	4.62
11	9	4.16
6	3	4.08
4	9	3.71
3	3	3.48
2	13	3.38
4	7	3.25
3	2	3.12
3	5	3.12
3	17	2.91
2	9	2.86
2	8	2.76
7	7	2.69
7	13	2.60
3	16	2.53
6	5	2.47
3	18	2.40
2	3	2.28
5	6	2.21
4	6	2.16
3	12	1.90
1	12	1.82
3	15	1.82
1	5	1.80
6	4	1.69
2	4	1.68
6	2	1.68
8	7	1.67
2	11	1.56
9	8	1.54

Table 8A. Activities of Cs-137, Top Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Dry Wt.)
5	13	1.46
1	11	1.43
11	8	1.43
9	9	1.40
8	5	1.34
5	5	1.32
2	1	1.29
.7	6	1.26
2	5	1.20
4	4	1.19
6	11	1.13
1	1	1.09
5	3	1.05
6	10	1.05
5	7	1.01
7	11	1.01
4	18	0.99
3	14	0.95
8	6	0.94
2	6	0.88
4	2	0.85
6	12	0.83
3	4	0.82
7	10	0.81
1	14	0.79
3	11	0.79
3	6	0.77
6	16	0.77
6	13	0.76
10	8	0.73
4	3	0.71
7	12	0.71
4	16	0.70
6	18	0.70
2	12	0.65
4	5	0.65
6	7	0.64
5	10	0.63
2	7	0.62
1	2	0.60

Table 8A. Activities of Cs-137, Top Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Dry Wt.)
4	14	0.60
5	2	0.60
5	9	0.60
7	14	0.60
8	8	0.60
4	17	0.56
5	8	0.56
6	19	0.54
4	19	0.53
5	4	0.53
3	13	0.49
6	6	0.49
5	19	0.47
6	20	0.46
3	9	0.44
5	12	0.43
6	8	0.43
7	9	0.43
3	19	0.39
5	14	0.38
5	18	0.38
6	17	0.38
8	9	0.36
1	3	0.35
5	17	0.34
5	15	0.33
6	14	0.33
2	14	0.29
5	11	0.29
6	9	0.27
7	3	0.25
4	13	<0.24
7	4	<0.24
3	7	0.21
5	16	<0.18
7	5	<0.14
3	10	0.09

Table 9A. Activities of Co-60, Middle Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Dry Wt.)
1	13	8.16
5	15	2.51
11	9	2.16
4	2	1.87
10	9	1.82
7	13	1.56
6	7	1.43
5	13	1.33
3	16	1.18
2	1	0.86
4	10	0.65
2	8	0.56
7	7	0.53
2	2	<0.48
6	4	0.43
2	10	<0.42
8	7	0.42
2	6	<0.39
5	7	<0.39
6	13	<0.39
1	4	<0.36
2	13	<0.36
3	18	<0.36
4	8	<0.36
5	3	<0.36
6	16	0.33
5	9	<0.29
5	10	<0.29
7	8	<0.28
3	15	<0.27
3	12	<0.26
4	9	<0.26
4	18	<0.26
6	3	<0.26
8	6	<0.26
4	3	<0.25
5	2	<0.25
5	12	<0.25
1	5	<0.24
2	12	<0.24
3	2	<0.24

Table 9A. Activities of Co-60, Middle Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Dry Wt.)
3	8	<0.24
4	7	<0.24
4	13	<0.24
4	16	<0.24
6	11	<0.24
7	4	<0.24
8	8	<0.24
5	11	<0.23
6	10	<0.23
6	14	<0.23
7	6	0.23
7	11	<0.23
8	5	<0.23
1	14	<0.22
2	11	<0.22
6	12	<0.22
5	19	<0.21
6	6	<0.21
6	18	<0.21
7	5	<0.21
6	17	<0.20
7	14	<0.20
4	19	<0.19
3	17	<0.18
4	5	<0.18
5	14	<0.18
5	16	<0.18
3	19	<0.17
5	18	<0.17
6	20	<0.17
7	3	<0.17
3	14	<0.14
1	11	<0.13
1	12	<0.13
2	3	<0.13
2	4	<0.13
2	5	<0.13
2	7	<0.13
3	6	<0.13
4	14	<0.13
4	17	<0.13

Table 9A. Activities of Co-60, Middle Soil Layer (Cont.
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Dry Wt.)
5	4	<0.13
5	6	<0.13
6	2	<0.13
6	8	<0.13
7	12	<0.13
9	8	<0.13
11	8	<0.13
1	1	<0.12
1	2	<0.12
2	9	<0.12
2	14	<0.12
3	1	<0.12
3	3	<0.12
3	4	<0.12
3	5	<0.12
3	13	<0.12
4	4	<0.12
4	6	<0.12
5	5	<0.12
5	8	<0.12
6	5	<0.12
6	9	<0.12
6	15	<0.12
6	19	<0.12
7	9	<0.12
7	10	<0.12
8	9	<0.12
9	9	<0.12
1	3	<0.11
5	17	<0.11
10	8	<0.11
3	11	0.04
3	7	<0.03
3	10	<0.02
3	9	*

* Activity not reported

Table 10A. Activities of Cs-137, Middle Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Wet Wt.)
1	13	4.80
4	2	1.87
11	9	1.56
2	2	1.32
9	9	1.32
5	6	1.30
6	13	1.26
2	1	1.20
3	17	1.16
10	9	1.14
6	4	1.11
1	1	1.03
7	13	1.00
2	6	0.86
5	7	0.86
11	8	0.78
6	5	0.77
6	7	0.75
5	15	0.74
6	3	0.74
6	16	0.74
3	16	0.71
2	7	0.70
6	2	0.70
3	6	0.59
7	8	0.59
2	10	0.57
1	3	0.50
5	5	0.50
5	2	0.49
2	4	0.47
3	8	0.47
2	11	0.46
5	13	0.46
7	5	0.46
5	3	0.41
7	12	<0.39
3	18	<0.36
8	9	0.36
10	8	0.36

Table 10A. Activities of Cs-137, Middle Soil Layer (Cont.)
 (Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Wet Wt.)
1	11	0.35
2	13	0.35
4	6	0.34
4	7	0.31
6	18	<0.31
1	5	0.30
5	9	<0.29
5	18	0.29
6	20	0.29
2	8	0.28
3	14	<0.28
3	19	0.28
7	9	0.28
1	12	<0.26
2	3	<0.26
2	5	<0.26
3	2	0.26
4	10	<0.26
4	14	<0.26
4	17	<0.26
4	18	<0.26
9	8	<0.26
8	6	0.25
8	7	<0.25
1	4	<0.24
2	9	<0.24
2	12	<0.24
2	14	<0.24
3	1	<0.24
3	13	<0.24
4	4	0.24
4	8	<0.24
4	13	<0.24
4	16	<0.24
5	8	<0.24
6	9	<0.24
6	15	<0.24
8	8	<0.24
7	10	0.23
1	14	<0.22

Table 10A. Activities of Cs-137, Middle Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/g Wet Wt.)
3	15	<0.22
6	12	<0.22
7	7	0.22
6	6	<0.21
6	17	0.21
7	6	0.20
3	12	<0.19
6	10	<0.19
6	19	0.19
5	10	0.18
5	19	<0.18
3	9	<0.17
4	9	0.17
5	11	<0.17
5	16	<0.17
6	14	<0.17
7	3	0.17
7	11	<0.17
8	5	<0.17
5	12	<0.16
7	14	<0.15
5	14	<0.14
4	3	<0.13
4	5	0.13
4	19	<0.13
5	4	<0.13
6	8	<0.13
1	2	<0.12
3	3	<0.12
3	4	<0.12
3	5	<0.12
6	11	<0.12
7	4	<0.12
5	17	<0.11
3	7	0.03
3	11	<0.02
3	10	<0.01

Table 1A. Activities of Sr-90 and TRU, Top Soil Layer
(Listed by transect number)*

Transect Number	Station Number	SR-90	Activity (pCi/g Dry Wt.)								
			UNC** SR-90	PU-238	UNC** PU-238	U-235	UNC** U-235	PU-239	UNC** PU-239	U-238	UNC** U-238
1	2	0.8	0.5	<0.0270	---	0.18	0.08	0.0676	0.0405	0.10	0.06
1	11	1.5	0.6	0.0243	0.0270	0.02	0.02	0.0432	0.0297	0.24	0.08
1	13	0.2	0.5	0.0062	0.0030	0.25	0.02	0.0486	0.0135	1.32	0.05
2	2	0.3	0.4	0.0135	0.0189	0.02	0.01	0.0216	0.0243	0.51	0.14
2	4	0.6	0.5	<0.0270	---	0.03	0.02	0.0203	0.0165	0.35	0.08
2	6	0.8	0.5	0.0195	0.0097	0.11	0.05	0.0089	0.0057	0.41	0.11
2	10	0.3	0.4	<0.0216	---	0.12	0.06	0.0027	0.0027	0.89	0.22
2	11	0.4	0.4	0.0034	0.0108	0.04	0.03	0.0270	0.0270	0.38	0.08
3	3	0.9	0.5	0.0097	0.0114	0.05	0.03	0.0241	0.0197	0.51	0.11
3	5	1.2	0.7	0.0027	0.0027	0.05	0.03	0.0249	0.0205	0.43	0.11
3	9	0.6	0.5	<0.0270	---	0.09	0.05	<0.0270	---	0.41	0.11
3	14	0.4	0.4	<0.0135	---	0.05	0.03	0.0459	0.0324	0.46	0.08
3	15	0.5	0.6	0.0038	0.0027	0.18	0.03	0.0214	0.0068	0.46	0.05
3	18	0.6	0.5	0.0003	0.0003	0.05	0.02	0.0297	0.0108	0.43	0.08
4	8	1.1	0.6	<0.0111	---	0.14	0.05	0.0432	0.0108	0.73	0.11
4	10	1.9	0.8	0.0046	0.0024	0.23	0.05	0.0730	0.0135	1.08	0.14
4	13	0.3	0.4	<0.0016	---	0.02	0.01	0.0257	0.0095	0.18	0.03
4	18	0.4	0.5	0.0007	0.0005	0.01	0.00	0.0324	0.0081	0.23	0.02
5	8	0.5	0.5	0.0014	0.0006	0.07	0.02	0.0405	0.0054	0.25	0.03
5	9	0.4	0.5	<0.0016	---	0.05	0.01	0.0730	0.0135	0.27	0.03
5	10	0.2	0.5	0.0032	0.0022	0.05	0.01	0.0514	0.0135	0.49	0.03
6	2	1.2	0.6	<0.0014	---	0.06	0.02	0.0024	0.0008	0.49	0.08
6	6	1.1	0.6	<0.0081	---	0.05	0.02	0.0095	0.0068	0.27	0.05
6	9	0.4	0.6	0.0059	0.0032	0.04	0.01	0.0676	0.0189	0.38	0.03
6	11	0.3	0.5	0.0035	0.0027	0.05	0.01	0.0568	0.0135	0.22	0.03
6	15	0.4	0.5	0.0070	0.0041	0.18	0.03	0.0730	0.0162	1.19	0.08
6	17	0.1	0.5	0.0008	0.0004	0.27	0.03	0.0432	0.0054	0.35	0.03
7	6	0.3	0.5	0.0001	0.0001	0.11	0.02	0.0595	0.0081	0.38	0.05
7	13	0.2	0.5	<0.0003	---	0.15	0.03	0.0541	0.0081	0.46	0.05
8	8	0.2	0.5	0.0021	0.0010	0.05	0.01	0.0595	0.0081	0.32	0.03

* Only 30 randomly-selected samples were analyzed.

** UNC = Uncertainty

Table 12A. Activities of Sr-90, Top Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity	
		pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
4	10	1.9	0.8
1	11	1.5	0.6
3	5	1.2	0.7
6	2	1.2	0.6
4	8	1.1	0.6
6	6	1.1	0.6
3	3	0.9	0.5
1	2	0.8	0.5
2	6	0.8	0.5
2	4	0.6	0.5
3	9	0.6	0.5
3	18	0.6	0.5
3	15	0.5	0.6
5	8	0.5	0.5
2	11	0.4	0.4
3	14	0.4	0.4
4	18	0.4	0.5
6	9	0.4	0.6
6	15	0.4	0.5
5	9	0.4	0.5
2	2	0.3	0.4
2	10	0.3	0.4
4	13	0.3	0.4
6	11	0.3	0.5
7	6	0.3	0.5
1	13	0.2	0.5
5	10	0.2	0.5
8	8	0.2	0.5
7	13	0.2	0.5
6	17	0.1	0.5

Table 13A. Activities of U-234, Top Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity	
		pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
6	15	3.78	0.27
4	10	2.97	0.27
1	13	2.70	0.27
2	10	2.00	0.35
4	8	1.97	0.24
3	18	1.89	0.19
2	2	1.19	0.22
3	5	1.11	0.19
3	3	1.03	0.19
3	15	1.03	0.08
6	17	0.89	0.05
7	13	0.89	0.08
1	11	0.86	0.16
3	14	0.86	0.14
5	10	0.86	0.03
6	2	0.81	0.08
6	9	0.81	0.03
3	9	0.76	0.16
2	6	0.73	0.14
7	6	0.73	0.08
2	11	0.70	0.14
6	6	0.70	0.08
2	4	0.68	0.14
8	8	0.65	0.05
1	2	0.62	0.16
6	11	0.51	0.05
5	8	0.51	0.05
4	13	0.49	0.05
5	9	0.46	0.05
4	18	0.41	0.03

Table 14A. Activities of U-235, Top Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity	
		pCi/g Dry	Uncertainty pCi/g Dry Wt.
6	17	0.27	0.027
1	13	0.25	0.024
4	10	0.23	0.051
1	2	0.18	0.084
6	15	0.18	0.027
3	15	0.18	0.027
7	13	0.15	0.030
4	8	0.14	0.046
2	10	0.12	0.062
2	6	0.11	0.046
7	6	0.11	0.022
3	9	0.09	0.049
5	8	0.07	0.016
6	2	0.06	0.019
3	3	0.05	0.032
3	5	0.05	0.032
3	14	0.05	0.027
3	18	0.05	0.022
6	6	0.05	0.019
5	10	0.05	0.008
6	11	0.05	0.014
5	9	0.05	0.011
8	8	0.05	0.014
2	11	0.04	0.027
6	9	0.04	0.008
2	4	0.03	0.024
1	11	0.02	0.018
2	2	0.02	0.014
4	13	0.02	0.011
4	18	0.01	0.004

Table 15A. Activities of U-238, Top Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity		
		pCi/g	Uncertainty	
		Dry	pCi/g	
		Wt.	Dry Wt.	
1	13	1.32	0.05	
6	15	1.19	0.08	
4	10	1.08	0.14	
2	10	0.89	0.22	
4	8	0.73	0.11	
2	2	0.51	0.14	
3	3	0.51	0.11	
6	2	0.49	0.08	
5	10	0.49	0.03	
3	14	0.46	0.08	
3	15	0.46	0.05	
7	13	0.46	0.05	
3	5	0.43	0.11	
3	18	0.43	0.08	
2	6	0.41	0.11	
3	9	0.41	0.11	
2	11	0.38	0.08	
6	9	0.38	0.03	
7	6	0.38	0.05	
2	4	0.35	0.08	
6	17	0.35	0.03	
8	8	0.32	0.03	
6	6	0.27	0.05	
5	9	0.27	0.03	
5	8	0.25	0.03	
1	11	0.24	0.08	
4	18	0.23	0.02	
6	11	0.22	0.03	
4	13	0.18	0.03	
1	2	0.10	0.06	

Table 16A. Activities of Pu-238, Top Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity	
		pCi/g Dry Wt.	Uncertainty pCi/g Dry Wt.
1	2	<0.0270	
2	4	<0.0270	
3	9	<0.0270	
1	11	0.0243	0.0270
2	10	<0.0216	
2	6	0.0195	0.0097
2	2	0.0135	0.0189
3	14	<0.0135	
3	3	0.0097	0.0114
6	6	<0.0081	
6	15	0.0070	0.0041
1	13	0.0062	0.0030
6	9	0.0059	0.0032
2	11	0.0054	0.0108
4	10	0.0046	0.0024
3	15	0.0038	0.0027
6	11	0.0035	0.0027
5	10	0.0032	0.0022
3	5	0.0027	0.0027
8	8	0.0021	0.0010
4	13	<0.0016	
5	9	<0.0016	
6	2	<0.0014	
5	8	0.0014	0.0006
4	8	<0.0011	
6	17	0.0008	0.0004
4	18	0.0007	0.0005
3	18	0.0003	0.0003
7	13	<0.0003	
7	6	0.0001	0.0001

Table 17A. Activities of Pu-239, Top Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity	
		pCi/g Dry	Uncertainty pCi/g Dry Wt.
4	10	0.0730	0.0135
6	15	0.0730	0.0162
5	9	0.0730	0.0135
1	2	0.0676	0.0405
6	9	0.0676	0.0189
7	6	0.0595	0.0081
8	8	0.0595	0.0081
6	11	0.0568	0.0135
7	13	0.0541	0.0081
5	10	0.0514	0.0135
1	13	0.0486	0.0135
3	14	0.0459	0.0324
1	11	0.0432	0.0297
4	8	0.0432	0.0108
6	17	0.0432	0.0054
5	8	0.0405	0.0054
4	18	0.0324	0.0081
3	18	0.0297	0.0108
2	11	0.0270	0.0270
3	9	<0.0270	
4	13	0.0257	0.0095
3	5	0.0249	0.0205
3	3	0.0241	0.0197
2	2	0.0216	0.0243
3	15	0.0214	0.0068
2	4	0.0203	0.0165
6	6	0.0095	0.0068
2	6	0.0089	0.0057
2	10	0.0027	0.0027
6	2	0.0024	0.0008

Table 18A. Activities* of Cs-134, Top Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/G Dry Wt.)
4	10	0.94
1	4	0.71
7	8	0.63
1	13	0.57
3	8	0.50
4	9	0.31
4	7	0.30
2	9	0.26
1	3	0.18
3	11	0.13

* All samples (234 total) were scanned for this radioisotope.
Activities were detected in only the samples listed.

Table 19A. Activities* of Mn-54, Top Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity (pCi/G Dry Wt.)
4	10	1.20
1	13	0.78
1	4	0.72
7	8	0.43
10	9	0.43
3	18	0.34
4	8	0.34
4	7	0.31
6	3	0.28
2	2	0.23
4	9	0.22
3	11	0.07

* All samples (234 total) were scanned for this radioisotope.
Activities were detected in only the samples listed.

Table 20A. Total Co-60 in Cores, Top Soil Layer
(Listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
1	1	588	666	0.882	7.7	76.4
1	2	768	666	1.154	7.7	184.4
1	3	689	666	1.035	7.7	165.4
1	4	827	666	1.241	7.7	10912.0
1	5	757	666	1.136	7.7	2179.2
1	11	1047	666	1.572	7.7	1905.4
1	12	866	666	1.300	7.7	2139.4
1	13	717	666	1.077	7.7	10040.0
1	14	894	666	1.342	7.7	107.3
2	1	857	666	1.287	7.7	908.6
2	2	824	666	1.237	7.7	14994.0
2	3	925	666	1.389	7.7	2442.0
2	4	741	666	1.112	7.7	1244.6
2	5	788	666	1.183	7.7	1126.4
2	6	742	666	1.114	7.7	103.9
2	7	678	666	1.019	7.7	88.2
2	8	995	666	1.494	7.7	5253.6
2	9	596	666	0.895	7.7	2867.5
2	10	681	666	1.022	7.7	6290.9
2	11	735	666	1.103	7.7	1587.6
2	12	1061	666	1.593	7.7	1145.7
2	13	741	666	1.112	7.7	18297.0
2	14	838	666	1.259	7.7	100.6
3	1	915	666	1.373	7.7	10701.0
3	2	877	666	1.317	7.7	3078.0
3	3	989	666	1.485	7.7	5697.6
3	4	870	666	1.306	7.7	1287.6
3	5	932	666	1.400	7.7	3757.2
3	6	750	666	1.126	7.7	652.5
3	7	796	666	1.196	7.7	278.7
3	8	758	666	1.138	7.7	6790.4
3	9	914	666	1.372	7.7	1810.0
3	10	989	666	1.485	7.7	79.1
3	11	840	666	1.261	7.7	1780.8
3	12	1069	666	1.605	7.7	4736.7
3	13	1058	666	1.589	7.7	127.0
3	14	799	666	1.199	7.7	239.6
3	15	691	666	1.038	7.7	2150.3
3	16	954	666	1.433	7.7	5562.8
3	17	576	666	0.864	7.7	2072.6
3	18	789	666	1.185	7.7	3693.3
3	19	862	666	1.293	7.7	215.4

Table 20A. Total Co-60 in Cores, Top Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
4	2	772	666	1.159	7.7	1143.0
4	3	1173	666	1.760	7.7	785.6
4	4	989	666	1.485	7.7	1187.0
4	5	818	666	1.229	7.7	450.2
4	6	773	666	1.160	7.7	1483.2
4	7	808	666	1.214	7.7	4204.0
4	8	694	666	1.042	7.7	7937.6
4	9	844	666	1.268	7.7	7674.6
4	10	736	666	1.105	7.7	32960.0
4	13	1058	666	1.589	7.7	127.0
4	14	868	666	1.303	7.7	243.0
4	16	938	666	1.407	7.7	112.5
4	17	899	666	1.350	7.7	116.9
4	18	900	666	1.351	7.7	585.0
4	19	873	666	1.311	7.7	427.8
5	2	803	666	1.205	7.7	554.0
5	3	886	666	1.330	7.7	1267.2
5	4	986	666	1.481	7.7	838.2
5	5	833	666	1.250	7.7	999.0
5	6	762	666	1.144	7.7	198.2
5	7	805	666	1.209	7.7	104.7
5	8	1077	666	1.616	7.7	129.2
5	9	1125	666	1.690	7.7	348.8
5	10	680	666	1.021	7.7	149.6
5	11	1096	666	1.646	7.7	230.1
5	12	958	666	1.438	7.7	201.1
5	13	979	666	1.469	7.7	1810.3
5	14	1007	666	1.512	7.7	835.7
5	15	1006	666	1.511	7.7	231.4
5	16	937	666	1.407	7.7	215.4
5	17	849	666	1.275	7.7	110.4
5	18	913	666	1.371	7.7	210.0
5	19	793	666	1.191	7.7	198.2

Table 20A. Total Co-60 in Cores, Top Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
6	2	748	666	1.122	7.7	754.9
6	3	731	666	1.097	7.7	4911.2
6	4	762	666	1.144	7.7	2477.5
6	5	732	666	1.098	7.7	2472.6
6	6	793	666	1.190	7.7	245.7
6	7	725	666	1.088	7.7	289.8
6	8	945	666	1.418	7.7	831.2
6	9	708	666	1.064	7.7	92.1
6	10	976	666	1.466	7.7	859.0
6	11	844	666	1.268	7.7	954.0
6	12	700	666	1.051	7.7	322.0
6	13	663	666	0.996	7.7	391.3
6	14	815	666	1.223	7.7	276.9
6	15	628	666	0.943	7.7	9952.8
6	16	714	666	1.072	7.7	956.5
6	17	931	666	1.397	7.7	214.0
6	18	688	666	1.034	7.7	144.5
6	19	832	666	1.249	7.7	99.8
6	20	723	666	1.085	7.7	122.8
7	3	918	666	1.377	7.7	348.6
7	4	950	666	1.426	7.7	228.0
7	5	919	666	1.380	7.7	128.6
7	6	567	666	0.851	7.7	714.3
7	7	714	666	1.072	7.7	4050.0
7	8	734	666	1.101	7.7	9756.5
7	9	1303	666	1.956	7.7	143.3
7	10	779	666	1.170	7.7	202.6
7	11	1072	666	1.610	7.7	1501.2
7	12	938	666	1.408	7.7	262.6
7	13	701	666	1.052	7.7	1548.7
7	14	974	666	1.462	7.7	447.9
8	5	920	666	1.381	7.7	2428.8
8	6	786	666	1.180	7.7	251.4
8	7	884	666	1.328	7.7	4677.8
8	8	991	777	1.275	9.0	128.8
8	9	918	666	1.378	7.7	101.0
9	8	903	666	1.355	7.7	252.8
9	9	941	666	1.413	7.7	94.1
10	8	1012	666	1.520	7.7	131.6
10	9	518	666	0.777	7.7	4060.0
11	8	761	666	1.143	7.7	197.9
11	9	662	666	0.994	7.7	5338.2

Table 21A. Total Cs-137 in Cores, Top Soil Layer
(listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
1	1	588	666	0.882	7.7	640.6
1	2	768	666	1.154	7.7	461.0
1	3	689	666	1.035	7.7	241.2
1	4	827	666	1.241	7.7	5555.2
1	5	757	666	1.136	7.7	1362.0
1	11	1047	666	1.572	7.7	1497.1
1	12	866	666	1.300	7.7	1576.4
1	13	717	666	1.077	7.7	5823.2
1	14	894	666	1.342	7.7	706.4
2	1	857	666	1.287	7.7	1105.7
2	2	824	666	1.237	7.7	5783.4
2	3	925	666	1.389	7.7	2109.0
2	4	741	666	1.112	7.7	1244.6
2	5	788	666	1.183	7.7	945.2
2	6	742	666	1.114	7.7	653.1
2	7	678	666	1.019	7.7	420.6
2	8	995	666	1.494	7.7	2746.2
2	9	596	666	0.895	7.7	1705.0
2	10	681	666	1.022	7.7	3268.0
2	11	735	666	1.103	7.7	1146.6
2	12	1061	666	1.593	7.7	689.5
2	13	741	666	1.112	7.7	2503.8
2	14	838	666	1.259	7.7	243.1
3	1	915	666	1.373	7.7	4874.9
3	2	877	666	1.317	7.7	2736.0
3	3	989	666	1.485	7.7	3442.3
3	4	870	666	1.306	7.7	713.4
3	5	932	666	1.400	7.7	2908.8
3	6	750	666	1.126	7.7	577.5
3	7	796	666	1.196	7.7	167.2
3	8	758	666	1.138	7.7	3501.3
3	9	914	666	1.372	7.7	402.2
3	10	989	666	1.485	7.7	89.0
3	11	840	666	1.261	7.7	663.6
3	12	1069	666	1.605	7.7	2031.5
3	13	1058	666	1.589	7.7	518.6
3	14	799	666	1.199	7.7	758.7
3	15	691	666	1.038	7.7	1258.4
3	16	954	666	1.433	7.7	2414.0
3	17	576	666	0.864	7.7	1675.3
3	18	789	666	1.185	7.7	1894.0
3	19	862	666	1.293	7.7	336.0

Table 21A. Total Cs-137 in Cores, Top Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
4	2	772	666	1.159	7.7	656.5
4	3	1173	666	1.760	7.7	832.5
4	4	989	666	1.485	7.7	1177.1
4	5	818	666	1.229	7.7	532.0
4	6	773	666	1.160	7.7	1668.6
4	7	808	666	1.214	7.7	2627.5
4	8	694	666	1.042	7.7	5051.2
4	9	844	666	1.268	7.7	3132.3
4	10	736	666	1.105	7.7	11330.0
4	13	1058	666	1.589	7.7	254.0
4	14	868	666	1.303	7.7	520.7
4	16	938	666	1.407	7.7	656.2
4	17	899	666	1.350	7.7	503.6
4	18	900	666	1.351	7.7	891.0
4	19	873	666	1.311	7.7	462.7
5	2	803	666	1.205	7.7	481.7
5	3	886	666	1.330	7.7	930.5
5	4	986	666	1.481	7.7	522.7
5	5	833	666	1.250	7.7	1098.9
5	6	762	666	1.144	7.7	1684.7
5	7	805	666	1.209	7.7	813.4
5	8	1077	666	1.616	7.7	602.9
5	9	1125	666	1.690	7.7	675.2
5	10	680	666	1.021	7.7	428.4
5	11	1096	666	1.646	7.7	317.9
5	12	958	666	1.438	7.7	411.9
5	13	979	666	1.469	7.7	1428.7
5	14	1007	666	1.512	7.7	382.6
5	15	1006	666	1.511	7.7	332.1
5	16	937	666	1.407	7.7	168.6
5	17	849	666	1.275	7.7	288.7
5	18	913	666	1.371	7.7	347.0
5	19	793	666	1.191	7.7	372.7

Table 21A. Total Cs-137 in Cores, Top Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
6	2	748	666	1.122	7.7	1255.8
6	3	731	666	1.097	7.7	2981.8
6	4	762	666	1.144	7.7	1288.3
6	5	732	666	1.098	7.7	1806.9
6	6	793	666	1.190	7.7	388.5
6	7	725	666	1.088	7.7	463.8
6	8	945	666	1.418	7.7	406.2
6	9	708	666	1.064	7.7	191.3
6	10	976	666	1.466	7.7	1025.0
6	11	844	666	1.268	7.7	954.0
6	12	700	666	1.051	7.7	581.0
6	13	663	666	0.996	7.7	504.1
6	14	815	666	1.223	7.7	268.8
6	15	628	666	0.943	7.7	3732.3
6	16	714	666	1.072	7.7	549.7
6	17	931	666	1.397	7.7	353.7
6	18	688	666	1.034	7.7	481.9
6	19	832	666	1.249	7.7	449.1
6	20	723	666	1.085	7.7	332.4
7	3	918	666	1.377	7.7	229.3
7	4	950	666	1.426	7.7	228.0
7	5	919	666	1.380	7.7	128.7
7	6	567	666	0.851	7.7	714.3
7	7	714	666	1.072	7.7	1921.4
7	8	734	666	1.101	7.7	4108.0
7	9	1303	666	1.956	7.7	560.2
7	10	779	666	1.170	7.7	631.2
7	11	1072	666	1.610	7.7	1083.0
7	12	938	666	1.408	7.7	665.9
7	13	701	666	1.052	7.7	1822.0
7	14	974	666	1.462	7.7	584.3
8	5	920	666	1.381	7.7	1232.8
8	6	786	666	1.180	7.7	738.5
8	7	884	666	1.328	7.7	1476.7
8	8	991	777	1.275	9.0	594.4
8	9	918	666	1.378	7.7	330.5
9	8	903	666	1.355	7.7	1390.4
9	9	941	666	1.413	7.7	1317.4
10	8	1012	666	1.520	7.7	739.0
10	9	518	666	0.777	7.7	2465.0
11	8	761	666	1.143	7.7	1088.9
11	9	662	666	0.994	7.7	2755.2

Table 22A. Total Co-60 in Cores, Middle Soil Layer
(Listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
1	1	1581	1332	1.187	15.4	189.7
1	2	1601	1332	1.202	15.4	192.1
1	3	2573	1776	1.448	20.5	283.0
1	4	2590	1998	1.296	23.1	932.4
1	5	1273	1110	1.147	12.8	305.6
1	11	1381	1110	1.244	12.8	179.5
1	12	815	666	1.224	7.7	106.0
1	13	1668	1110	1.503	12.8	13613.6
1	14	896	666	1.346	7.7	197.2
2	1	1616	1332	1.213	15.4	1389.9
2	2	1375	1332	1.032	15.4	660.0
2	3	1108	1110	0.998	12.8	144.0
2	4	1236	1110	1.114	12.8	160.7
2	5	1231	1110	1.109	12.8	160.0
2	6	1209	888	1.362	10.3	471.6
2	7	2254	1776	1.269	20.5	293.0
2	8	1224	1110	1.103	12.8	685.5
2	9	1340	1110	1.207	12.8	160.8
2	10	1787	1776	1.006	20.5	750.6
2	11	1332	1110	1.200	12.8	293.0
2	12	1407	1110	1.267	12.8	337.6
2	13	1228	1110	1.106	12.8	442.2
2	14	1349	1110	1.215	12.8	161.9
3	1	1723	1221	1.411	14.1	206.7
3	2	1691	999	1.692	11.5	405.8
3	3	2029	1332	1.523	15.4	243.5
3	4	2220	1443	1.538	16.7	266.4
3	5	1638	1110	1.476	12.8	196.6
3	6	1789	1443	1.240	16.7	232.6
3	7	1913	1443	1.326	16.7	57.4
3	8	656	555	1.182	6.4	157.4
3	9	1535	1110	1.383	12.8	
3	10	847	666	1.271	7.7	16.9
3	11	863	666	1.295	7.7	34.5
3	12	806	555	1.452	6.4	209.5
3	13	1064	666	1.598	7.7	127.7
3	14	767	666	1.152	7.7	107.4
3	15	856	666	1.285	7.7	231.0
3	16	717	666	1.077	7.7	846.2
3	17	863	666	1.296	7.7	155.4
3	18	920	666	1.381	7.7	331.2
3	19	828	666	1.242	7.7	140.7

Table 22A. Total Co-60 in Cores, Middle Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
4	2	2291	1554	1.474	17.9	4283.9
4	3	2404	1776	1.354	20.5	601.0
4	4	1993	1332	1.496	15.4	239.1
4	5	1934	1332	1.452	15.4	348.1
4	6	1946	1110	1.753	12.8	233.5
4	7	1489	999	1.490	11.5	357.4
4	8	720	666	1.081	7.7	259.2
4	9	1049	1110	0.945	12.8	272.8
4	10	1369	1110	1.233	12.8	890.0
4	13	995	666	1.494	7.7	238.8
4	14	862	666	1.293	7.7	112.0
4	16	959	666	1.440	7.7	230.2
4	17	665	666	0.999	7.7	86.5
4	18	1042	666	1.564	7.7	270.8
4	19	891	666	1.337	7.7	169.3
5	2	1017	1110	0.916	12.8	254.2
5	3	1665	1110	1.500	12.8	599.4
5	4	1500	1110	1.351	12.8	195.0
5	5	1425	1110	1.284	12.8	171.0
5	6	1262	1110	1.136	12.8	164.0
5	7	1070	1110	0.964	12.8	417.3
5	8	963	666	1.445	7.7	115.5
5	9	853	666	1.280	7.7	247.2
5	10	794	666	1.192	7.7	230.2
5	11	979	666	1.470	7.7	225.2
5	12	963	666	1.446	7.7	240.8
5	13	913	666	1.370	7.7	1213.6
5	14	1026	666	1.540	7.7	184.7
5	15	709	666	1.064	7.7	1778.5
5	16	835	666	1.254	7.7	150.3
5	17	846	666	1.271	7.7	93.1
5	18	699	666	1.050	7.7	118.9
5	19	868	666	1.304	7.7	182.4

Table 22A. Total Co-60 in Cores, Middle Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
6	2	1200	1110	1.081	12.8	156.0
	3	1155	1110	1.040	12.8	300.2
	4	1190	1110	1.072	12.8	511.7
	5	1551	1110	1.397	12.8	186.1
	6	1232	1110	1.110	12.8	258.8
	7	1306	1776	0.735	20.5	1867.8
	8	1169	888	1.317	10.3	152.0
	9	1386	1110	1.248	12.8	166.3
	10	1601	1110	1.442	12.8	368.2
	11	1469	1110	1.323	12.8	352.6
	12	1869	1110	1.684	12.8	411.2
	13	1275	1110	1.149	12.8	497.4
	14	1526	1110	1.374	12.8	350.9
	15	1303	1110	1.173	12.8	156.3
	16	931	777	1.198	9.0	307.2
	17	1392	1110	1.254	12.8	278.5
	18	1092	1110	0.983	12.8	229.2
	19	1243	1110	1.119	12.8	149.1
	20	1000	1110	0.901	12.8	170.0
7	3	773	888	0.871	10.3	131.5
	4	1580	1110	1.423	12.8	379.2
	5	1219	1110	1.098	12.8	256.0
	6	1369	1110	1.233	12.8	314.9
	7	1283	1110	1.156	12.8	679.9
	8	716	666	1.076	7.7	200.6
	9	698	666	1.047	7.7	83.7
	10	1083	666	1.626	7.7	130.0
	11	888	666	1.334	7.7	204.3
	12	1343	1332	1.008	15.4	174.6
	13	1048	1332	0.786	15.4	1634.4
8	14	806	666	1.210	7.7	161.1
	5	872	666	1.309	7.7	200.5
	6	929	666	1.395	7.7	241.6
	7	848	666	1.273	7.7	356.0
	8	1165	777	1.499	9.0	279.6
	9	1108	666	1.664	7.7	133.0
	8	818	666	1.229	7.7	106.4
	9	1049	666	1.575	7.7	125.9
	10	995	666	1.493	7.7	109.4
	9	1021	666	1.533	7.7	1857.8
	11	746	666	1.120	7.7	97.0
	11	903	666	1.356	7.7	1951.2

Table 23A. Total Cs-137 in Cores, Middle Soil Layer
(Listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
1	1	1581	1332	1.187	15.4	1628.3
1	2	1601	1332	1.202	15.4	192.1
1	3	2573	1776	1.448	20.5	1286.4
1	4	2590	1998	1.296	23.1	621.6
1	5	1273	1110	1.147	12.8	382.0
1	11	1381	1110	1.244	12.8	483.3
1	12	815	666	1.224	7.7	212.0
1	13	1668	1110	1.503	12.8	8008.0
1	14	896	666	1.346	7.7	197.2
2	1	1616	1332	1.213	15.4	1939.4
2	2	1375	1332	1.032	15.4	1815.0
2	3	1108	1110	0.998	12.8	288.0
2	4	1236	1110	1.114	12.8	581.0
2	5	1231	1110	1.109	12.8	320.0
2	6	1209	888	1.362	10.3	1040.0
2	7	2254	1776	1.269	20.5	1577.7
2	8	1224	1110	1.103	12.8	342.8
2	9	1340	1110	1.207	12.8	321.6
2	10	1787	1776	1.006	20.5	1018.7
2	11	1332	1110	1.200	12.8	612.6
2	12	1407	1110	1.267	12.8	337.6
2	13	1228	1110	1.106	12.8	429.9
2	14	1349	1110	1.215	12.8	323.8
3	1	1723	1221	1.411	14.1	413.4
3	2	1691	999	1.692	11.5	439.6
3	3	2029	1332	1.523	15.4	243.5
3	4	2220	1443	1.538	16.7	266.4
3	5	1638	1110	1.476	12.8	196.6
3	6	1789	1443	1.240	16.7	1055.6
3	7	1913	1443	1.326	16.7	57.3
3	8	656	555	1.182	6.4	308.2
3	9	1535	1110	1.383	12.8	260.9
3	10	847	666	1.271	7.7	8.4
3	11	863	666	1.295	7.7	17.2
3	12	806	555	1.452	6.4	153.1
3	13	1064	666	1.598	7.7	255.4
3	14	767	666	1.152	7.7	214.8
3	15	856	666	1.285	7.7	188.2
3	16	717	666	1.077	7.7	509.1
3	17	863	666	1.296	7.7	1001.1
3	18	920	666	1.381	7.7	331.2
3	19	828	666	1.242	7.7	231.7

Table 23A. Total Cs-137 in Cores, Middle Soil Layer (Cont.)
(listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
4	2	2291	1554	1.474	17.9	4283.8
4	3	2404	1776	1.354	20.5	312.5
4	4	1993	1332	1.496	15.4	478.2
4	5	1934	1332	1.452	15.4	251.4
4	6	1946	1110	1.753	12.8	661.5
4	7	1489	999	1.490	11.5	461.6
4	8	720	666	1.081	7.7	172.8
4	9	1049	1110	0.945	12.8	178.3
4	10	1369	1110	1.233	12.8	356.0
4	13	995	666	1.494	7.7	238.8
4	14	862	666	1.293	7.7	224.0
4	16	959	666	1.440	7.7	230.2
4	17	665	666	0.999	7.7	173.0
4	18	1042	666	1.564	7.7	270.8
4	19	891	666	1.337	7.7	115.8
5	2	1017	1110	0.916	12.8	498.2
5	3	1665	1110	1.500	12.8	682.6
5	4	1500	1110	1.351	12.8	195.0
5	5	1425	1110	1.284	12.8	712.5
5	6	1262	1110	1.136	12.8	1640.0
5	7	1070	1110	0.964	12.8	920.2
5	8	963	666	1.445	7.7	231.0
5	9	853	666	1.280	7.7	247.2
5	10	794	666	1.192	7.7	142.8
5	11	979	666	1.470	7.7	166.4
5	12	963	666	1.446	7.7	154.1
5	13	913	666	1.370	7.7	419.7
5	14	1026	666	1.540	7.7	143.6
5	15	709	666	1.064	7.7	524.3
5	16	835	666	1.254	7.7	141.9
5	17	846	666	1.271	7.7	93.1
5	18	699	666	1.050	7.7	202.7
5	19	868	666	1.304	7.7	156.3

Table 23A. Total Cs-137 in Cores, Middle Soil Layer (Cont.)
(Listed by transect number)

Transect Number	Station Number	Sample Dry Wt. (g)	Core Volume (cm ³)	Core Density (g/cm ³)	Core Length (cm)	Activity in Core (pCi)
6	2	1200	1110	1.081	12.8	840.0
6	3	1155	1110	1.040	12.8	854.4
6	4	1190	1110	1.072	12.8	1320.9
6	5	1551	1110	1.397	12.8	1194.1
6	6	1232	1110	1.110	12.8	258.7
6	7	1306	1776	0.735	20.5	979.6
6	8	1169	888	1.317	10.3	152.0
6	9	1386	1110	1.248	12.8	332.6
6	10	1601	1110	1.442	12.8	304.1
6	11	1469	1110	1.323	12.8	176.3
6	12	1869	1110	1.684	12.8	411.2
6	13	1275	1110	1.149	12.8	1606.9
6	14	1526	1110	1.374	12.8	259.3
6	15	1303	1110	1.173	12.8	312.6
6	16	931	777	1.198	9.0	688.7
6	17	1392	1110	1.254	12.8	292.3
6	18	1092	1110	0.983	12.8	338.3
6	19	1243	1110	1.119	12.8	236.0
6	20	1000	1110	0.901	12.8	290.0
7	3	773	888	0.871	10.3	131.4
7	4	1580	1110	1.423	12.8	189.6
7	5	1219	1110	1.098	12.8	560.8
7	6	1369	1110	1.233	12.8	273.8
7	7	1283	1110	1.156	12.8	282.2
7	8	716	666	1.076	7.7	422.6
7	9	698	666	1.047	7.7	195.3
7	10	1083	666	1.626	7.7	249.1
7	11	888	666	1.334	7.7	151.0
7	12	1343	1332	1.008	15.4	523.8
7	13	1048	1332	0.786	15.4	1047.6
7	14	806	666	1.210	7.7	120.8
8	5	872	666	1.309	7.7	148.1
8	6	929	666	1.395	7.7	232.3
8	7	848	666	1.273	7.7	211.9
8	8	1165	777	1.499	9.0	279.6
8	9	1108	666	1.664	7.7	399.0
9	8	818	666	1.229	7.7	212.8
9	9	1049	666	1.575	7.7	1384.9
10	8	995	666	1.493	7.7	358.0
10	9	1021	666	1.533	7.7	1163.6
11	8	746	666	1.120	7.7	582.0
11	9	903	666	1.356	7.7	1409.2

Table 24A. Total Sr-90 and TRU in Cores, Top Soil Layer
(Listed by transect number)

Transect Number	Station Number	Total Activity in Core (pCi)					
		Sr-90	Pu-238	U-235	Pu-239	U-238	U-234
1	2	616	20	138	52	77	477
1	11	1590	25	21	45	254	911
1	13	138	4	173	33	916	1874
2	2	244	10	16	17	415	969
2	4	429	19	21	14	250	486
2	6	605	14	83	6	310	552
2	10	198	14	79	1	588	1322
2	11	288	3	28	19	273	504
3	3	865	9	48	23	490	990
3	5	1162	2	48	24	416	1075
3	9	550	24	82	24	375	696
3	14	310	10	38	35	356	666
3	15	339	2	122	14	312	698
3	18	455	0	37	22	326	1434
4	8	743	0	94	29	493	1330
4	10	1416	3	171	54	804	2213
4	13	321	1	21	27	192	525
4	18	357	0	8	28	205	366
5	8	522	1	73	42	261	533
5	9	457	1	57	83	308	525
5	10	138	2	34	35	340	597
6	2	862	1	43	1	352	581
6	6	884	6	40	7	217	563
6	9	281	4	28	47	267	570
6	11	257	3	42	48	189	438
6	15	247	4	111	45	737	2341
6	17	90	0	244	39	316	805
7	6	165	0	60	32	209	403
7	13	139	0	104	37	320	620
8	8	198	2	49	58	317	644

Table 25A. Total Co-60 in Cores, Top Soil Layer
 (Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
4	10	32960.0
2	13	18297.0
2	2	14994.0
1	4	10912.0
3	1	10701.0
1	13	10040.0
6	15	9952.8
7	8	9756.5
4	8	7937.6
4	9	7674.6
3	8	6790.4
2	10	6290.9
3	3	5697.6
3	16	5562.7
11	9	5338.2
2	8	5253.6
6	3	4911.2
3	12	4736.6
8	7	4677.8
4	7	4204.0
10	9	4060.0
7	7	4050.0
3	5	3757.2
3	18	3693.3
3	2	3078.0
2	9	2867.5
6	4	2477.5
6	5	2472.6
2	3	2442.0
8	5	2428.8
1	5	2179.2
3	15	2150.3
1	12	2139.4
3	17	2072.5
1	11	1905.4
5	13	1810.3
3	9	1810.0
3	11	1780.8

Table 25A. Total Co-60 in Cores, Top Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
2	11	1587.6
7	13	1548.7
7	11	1501.2
4	6	1483.2
3	4	1287.6
5	3	1267.2
2	4	1244.6
4	4	1187.0
2	12	1145.7
4	2	1143.0
2	5	1126.4
5	5	999.0
6	16	956.5
6	11	954.0
2	1	908.5
6	10	859.0
5	4	838.2
5	14	835.7
6	8	831.2
4	3	785.5
6	2	754.9
7	6	714.3
3	6	652.5
4	18	585.0
5	2	553.9
4	5	450.1
7	14	447.9
4	19	427.8
6	13	391.3
5	9	348.8
7	3	348.6
6	12	322.0
6	7	289.8
3	7	278.7
6	14	276.9
7	12	262.6
9	8	252.8
8	6	251.4

Table 25A. Total Co-60 in Cores, Top Soil Layer (Cont.)
 (Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
6	6	245.7
4	14	243.0
3	14	239.6
5	15	231.4
5	11	230.1
7	4	228.0
5	16	215.4
3	19	215.3
6	17	214.0
5	18	210.0
7	10	202.6
5	12	201.1
5	19	198.2
5	6	198.2
11	8	197.9
1	2	184.4
1	3	165.4
5	10	149.6
6	18	144.5
7	9	143.3
10	8	131.6
5	8	129.2
8	8	128.8
7	5	128.6
3	13	127.0
4	13	127.0
6	20	122.8
4	17	116.9
4	16	112.5
5	17	110.4
1	14	107.3
5	7	104.7
2	6	103.9
8	9	101.0
2	14	100.6
6	19	99.8
9	9	94.1
6	9	92.1
2	7	88.2
3	10	79.1
1	1	76.4

Table 26A. Total Cs-137 in Cores, Top Soil Layer
 (Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
4	10	11330.0
1	13	5823.2
2	2	5783.4
1	4	5555.2
4	8	5051.2
3	1	4874.9
7	8	4108.0
6	15	3732.3
3	8	3501.3
3	3	3442.3
2	10	3268.0
4	9	3132.3
6	3	2981.8
3	5	2908.8
11	9	2755.2
2	8	2746.2
3	2	2736.0
4	7	2627.5
2	13	2503.8
10	9	2465.0
3	16	2414.0
2	3	2109.0
3	12	2031.5
7	7	1921.4
3	18	1894.0
7	13	1822.0
6	5	1806.9
2	9	1705.0
5	6	1684.7
3	17	1675.3
4	6	1668.6
1	12	1576.4
1	11	1497.1
8	7	1476.8
5	13	1428.7
9	8	1390.4
1	5	1362.0
9	9	1317.4
6	4	1288.3
3	15	1258.4
6	2	1255.8
2	4	1244.6

Table 26A. Total Cs-137 in Cores, Top Soil Layer (Cont.)
 (Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
8	5	1232.8
4	4	1177.1
2	11	1146.6
2	1	1105.7
5	5	1098.9
11	8	1088.8
7	11	1083.0
6	10	1024.9
6	11	954.0
2	5	945.2
5	3	930.4
4	18	891.0
4	3	832.4
5	7	813.4
3	14	758.7
10	8	738.9
8	6	738.5
7	6	714.3
3	4	713.4
1	14	706.3
2	12	689.5
5	9	675.2
7	12	665.8
3	11	663.6
4	2	656.4
4	16	656.2
2	6	653.0
1	1	640.5
7	10	631.1
5	8	602.9
8	8	594.4
7	14	584.3
6	12	581.0
3	6	577.5
7	9	560.1
6	16	549.6
4	5	532.0
5	4	522.6
4	14	520.7

Table 26A. Total Cs-137 in Cores, Top Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
3	13	518.5
6	13	504.1
4	17	503.5
6	18	481.9
5	2	481.7
6	7	463.7
4	19	462.7
1	2	461.0
6	19	449.1
5	10	428.4
2	7	420.6
5	12	411.8
6	8	406.1
3	9	402.2
6	6	388.5
5	14	382.6
5	19	372.7
6	17	353.7
5	18	346.9
3	19	336.0
6	20	332.3
5	15	332.1
8	9	330.5
5	11	317.8
5	17	288.7
6	14	268.8
4	13	254.0
2	14	243.1
1	3	241.2
7	3	229.3
7	4	228.0
6	9	191.2
5	16	168.6
3	7	167.2
7	5	128.6
3	10	89.0

Table 27A. Total Co-60 in Cores, Middle Soil Layer
 (Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
1	13	13613.6
4	2	4283.9
11	9	1951.2
6	7	1867.8
10	9	1857.8
5	15	1778.5
7	13	1634.4
2	1	1389.9
5	13	1213.6
1	4	932.4
4	10	890.0
3	16	846.2
2	10	750.6
2	8	685.5
7	7	679.9
2	2	660.0
4	3	601.0
5	3	599.4
6	4	511.7
6	13	497.4
2	6	471.6
2	13	442.2
5	7	417.3
6	12	411.2
3	2	405.8
7	4	379.2
6	10	368.2
4	7	357.4
8	7	356.0
6	11	352.6
6	14	350.9
4	5	348.1
2	12	337.6
3	18	331.2
7	6	314.9
6	16	307.2

Table 27A. Total Co-60 in Cores, Middle Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
1	5	305.6
6	3	300.2
2	7	293.0
2	11	293.0
1	3	283.0
8	8	279.6
6	17	278.5
4	9	272.8
4	18	270.8
3	4	266.4
4	8	259.2
6	6	258.8
7	5	256.0
5	2	254.2
5	9	247.2
3	3	243.5
8	6	241.6
5	12	240.8
4	4	239.1
4	13	238.8
4	6	233.5
3	6	232.6
3	15	231.0
4	16	230.2
5	10	230.1
6	18	229.2
5	11	225.2
3	12	209.5
3	1	206.7
7	11	204.3
7	8	200.6
8	5	200.4
1	14	197.2
3	5	196.6
5	4	195.0
1	2	192.1
1	1	189.7
6	5	186.1
5	14	184.6

Table 27A. Total Co-60 in Cores, Middle Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
5	19	182.3
1	11	179.5
7	12	174.6
5	5	171.0
6	20	170.0
4	19	169.2
6	9	166.3
5	6	164.0
2	14	161.9
7	14	161.1
2	9	160.8
2	4	160.7
2	5	160.0
3	8	157.4
6	15	156.3
6	2	156.0
3	17	155.3
6	8	152.0
5	16	150.3
6	19	149.1
2	3	144.0
3	19	140.6
8	9	133.0
7	3	131.4
7	10	130.0
3	13	127.7
9	9	125.9
5	18	118.8
5	8	115.5
4	14	112.0
10	8	109.4
3	14	107.4
9	8	106.4
1	12	106.0
11	8	97.0
5	17	93.1
4	17	86.5
7	9	83.7
3	7	57.3
3	11	34.5
3	10	16.9
3	9	

Table 28A. Total Cs-137 in Cores, Middle Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
1	13	8008.0
4	2	4283.8
2	1	1939.3
2	2	1815.0
5	6	1640.0
1	1	1628.2
6	13	1606.9
2	7	1577.6
11	9	1409.2
9	9	1384.9
6	4	1320.9
1	3	1286.3
6	5	1194.1
10	9	1163.6
3	6	1055.6
7	13	1047.6
2	6	1039.9
2	10	1018.6
3	17	1001.1
6	7	979.6
5	7	920.2
6	3	854.4
6	2	840.0
5	5	712.5
6	16	688.7
5	3	682.6
4	6	661.5
1	4	621.6
2	11	612.6
11	8	582.0
2	4	580.9
7	5	560.8
5	15	524.3
7	12	523.8
3	16	509.1
5	2	498.2
1	11	483.2

Table 28A. Total Cs-137 in Cores, Middle Soil Layer (Cont.)
 (Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
4	4	478.2
4	7	461.6
3	2	439.6
2	13	429.9
7	8	422.6
5	13	419.7
3	1	413.4
6	12	411.2
8	9	399.0
1	5	382.0
10	8	358.0
4	10	356.0
2	8	342.7
6	18	338.3
2	12	337.6
6	9	332.6
3	18	331.2
2	14	323.8
2	9	321.6
2	5	320.0
6	15	312.6
4	3	312.5
3	8	308.2
6	10	304.1
6	17	292.3
6	20	290.0
2	3	288.0
7	7	282.2
8	8	279.6
7	6	273.8
4	18	270.8
3	4	266.4
3	9	260.9
6	14	259.3
6	6	258.7
3	13	255.4
4	5	251.4
7	10	249.1

Table 28A. Total Cs-137 in Cores, Middle Soil Layer (Cont.)
(Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
5	9	247.2
3	3	243.5
4	13	238.8
6	19	236.0
8	6	232.3
3	19	231.7
5	8	231.0
4	16	230.2
4	14	224.0
3	14	214.8
9	8	212.8
1	12	212.0
8	7	211.9
5	18	202.7
1	14	197.2
3	5	196.6
7	9	195.3
5	4	195.0
1	2	192.1
7	4	189.6
3	15	188.2
4	9	178.3
6	11	176.3
4	17	173.0
4	8	172.8
5	11	166.4
5	19	156.3
5	12	154.1
3	12	153.1
6	8	152.0
7	11	151.0
8	5	148.1
5	14	143.6
5	10	142.8
5	16	141.9
7	3	131.4
7	14	120.8
4	19	115.8
5	17	93.1
3	7	57.3
3	11	17.2
3	10	8.4

Table 29A. Total Sr-90 in Cores, Top Soil Layer
 (Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
1	11	1591.1
4	10	1416.0
3	5	1162.5
6	6	884.7
3	3	865.0
6	2	861.8
4	8	743.2
1	2	616.2
2	6	605.8
3	9	549.8
5	8	522.6
5	9	457.1
3	18	455.2
2	4	429.1
4	18	356.9
3	15	339.1
4	13	321.5
3	14	309.9
2	11	288.2
6	9	281.8
6	11	257.8
6	15	247.7
2	2	244.5
2	10	198.3
8	8	198.1
7	6	165.6
7	13	139.4
5	10	138.9
1	13	138.8
6	17	90.5

Table 30A. Total U-234 in Cores, Top Soil Layer
 (Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
6	15	2341.2
4	10	2213.5
1	13	1874.6
3	18	1434.1
4	8	1331.0
2	10	1322.0
3	5	1075.4
3	3	989.9
2	2	969.9
1	11	912.2
6	17	805.6
3	15	698.7
3	9	696.5
3	14	666.4
8	8	644.0
7	13	620.3
5	10	597.6
6	2	581.7
6	9	570.7
6	6	563.0
2	6	552.8
5	8	533.1
5	9	525.7
4	13	525.1
2	11	504.4
2	4	486.3
1	2	477.5
6	11	438.4
7	6	403.0
4	18	365.9

Table 31A. Total U-235 in Cores, Top Soil Layer
 (Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
6	17	244.4
1	13	173.5
4	10	171.4
1	2	138.6
3	15	122.1
6	15	111.4
7	13	104.5
4	8	94.5
2	6	83.3
3	9	82.4
2	10	79.3
5	8	73.1
7	6	60.7
5	9	57.1
8	8	49.5
3	5	48.4
3	3	48.0
6	2	43.0
6	11	42.9
6	6	40.2
3	14	38.7
3	18	37.9
5	10	34.7
2	11	28.8
6	9	28.1
2	4	21.4
4	13	21.4
1	11	21.2
2	2	16.3
4	18	8.9

Table 32A. Total U-238 in Cores, Top Soil Layer
 (Ranked by activity level)

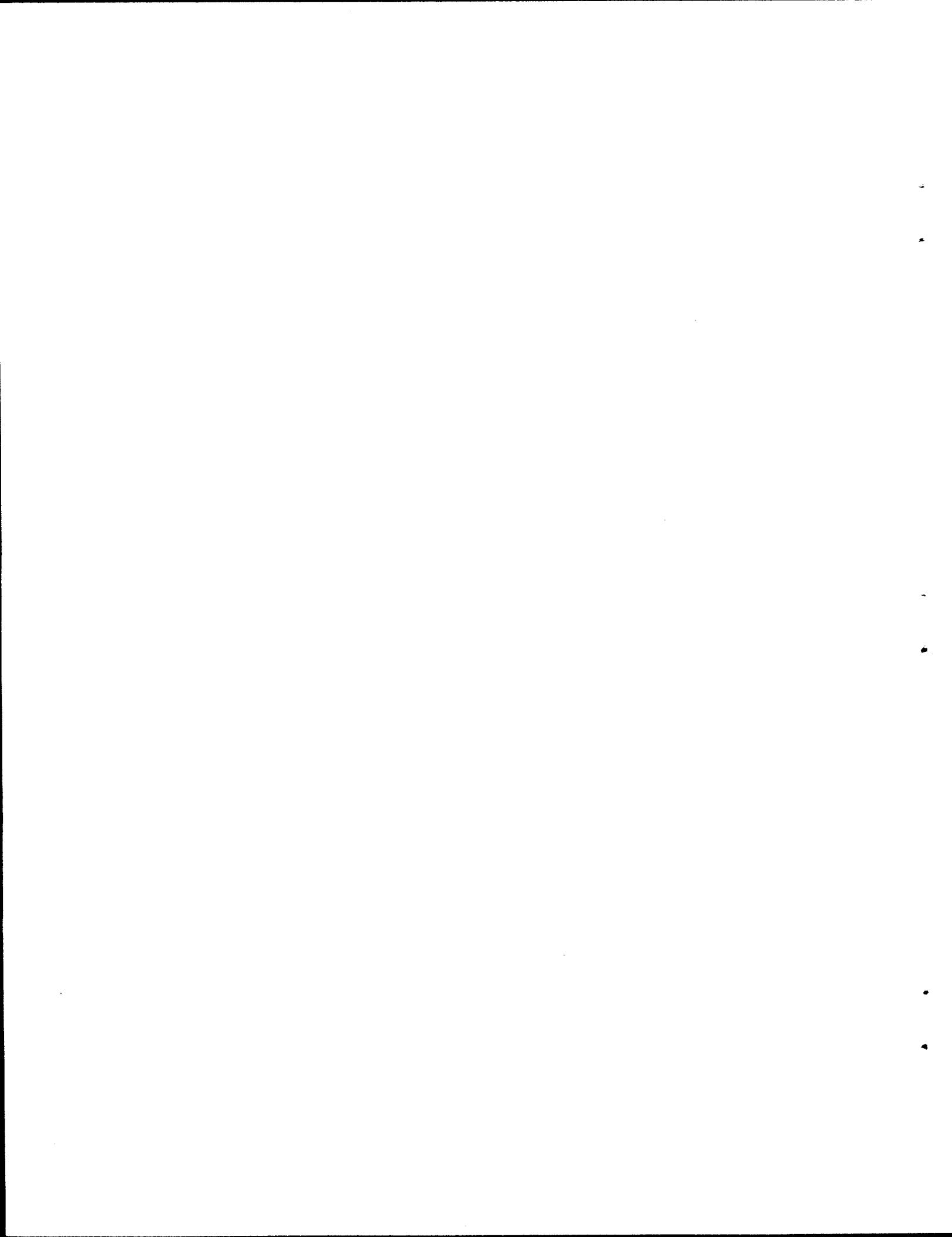
Transect Number	Station Number	Activity in Core (pCi)
1	13	916.5
4	10	804.9
6	15	737.0
2	10	588.2
4	8	493.2
3	3	490.1
3	5	416.5
2	2	415.6
3	9	375.7
3	14	356.4
6	2	351.9
5	10	340.4
3	18	326.2
7	13	320.6
8	8	317.0
6	17	316.8
3	15	312.0
2	6	310.4
5	9	308.6
2	11	273.8
6	9	267.7
5	8	261.3
1	11	254.5
2	4	250.3
6	6	217.1
7	6	209.7
4	18	205.2
4	13	192.9
6	11	189.1
1	2	77.0

Table 33A. Total Pu-238 in Cores, Top Soil Layer
 (Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
1	11	25.7
3	9	24.7
1	2	20.7
2	4	19.3
2	6	14.7
2	10	14.2
2	2	11.0
3	14	10.4
3	3	9.3
6	6	6.5
6	15	4.3
1	13	4.3
6	9	4.1
2	11	3.8
4	10	3.4
6	11	3.0
3	5	2.6
3	15	2.5
5	10	2.2
8	8	2.0
5	9	1.8
4	13	1.7
5	8	1.4
6	2	1.0
4	8	0.7
6	17	0.7
4	18	0.6
3	18	0.2
7	13	0.2
7	6	0.0

Table 34A. Total Pu-239 in Cores, Top Soil Layer
(Ranked by activity level)

Transect Number	Station Number	Activity in Core (pCi)
5	9	83.4
8	8	58.9
4	10	54.4
1	2	52.0
6	11	48.8
6	9	47.6
1	11	45.8
6	15	45.2
5	8	42.3
6	17	39.1
7	13	37.7
5	10	35.7
3	14	35.5
1	13	33.7
7	6	32.8
4	8	29.1
4	18	28.9
4	13	27.5
3	9	24.7
3	5	24.1
3	3	23.1
3	18	22.5
2	11	19.4
2	2	17.6
2	4	14.5
3	15	14.5
6	6	7.6
2	6	6.7
2	10	1.7
6	2	1.7



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